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DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
National Institutes of Health

Memorandum

Date November 4, 1986

From Annual Report Coordinator, DRS

Subject DRS Annual Report 1986

To Associate Director for Intramural Affairs, NIH

Attached are two copies of the DRS project reports (Form PHS-6040) for this year. Two additional copies have been sent, as requested, to the Research Documentation Section, DRG. Two copies of the DRS printed Annual Report will be sent to you as soon as we receive it from the printers.

James Doherty
James Doherty

Attachments

BIOMEDICAL ENGINEERING AND INSTRUMENTATION BRANCH

DIVISION OF RESEARCH SERVICES

NATIONAL INSTITUTES OF HEALTH (U.S.)
Oo

ANNUAL REPORT FY 1986

Dr. Murray Eden, Chief

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DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10001-18 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Pharmacokinetics

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.L. Dedrick	Chief, CHES	BEIB, DRS

Others:

F. Farris	North Dakota State University	
R. J. Lutz	Chemical Engineer	BEIB, DRS
F. King	North Carolina A&T Univ.	
P. F. Morrison	Physical Scientist	BEIB, DRS

COOPERATING UNITS *(if any)*
CPB, NCI (J.M. Collins); DR-CC (J.L. Doppman); NTP-NIEHS (H.B. Matthews); SNB-NINCDS (E.H. Oldfield); University of Maryland (M.Egorin).

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Chemical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.5	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Pharmacokinetic models are developed for the distribution and disposition of drugs, environmental contaminants, and endogenous metabolites in animals and man. They provide a plausible set of equations that can be used to extrapolate data from animals to man and thereby improve chemotherapy and risk assessment. Emphasis has been placed on regional drug administration, and this has led to the development of spatially distributed models of drug transport in tissue. These analyses have provided considerable insight into the penetration depths of drugs administered intraperitoneally or by infusion into the brain. Pharmacokinetic theory which was developed for intra-arterial drug administration combined with extracorporeal treatment of venous drainage has been further validated in the clinic. Preliminary results have shown the feasibility of documenting appropriate vascular drainage with indocyanine green. Interspecies scaling of regional drug administration has been explored, and a clear allometric basis has been elaborated.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10002-21 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Implant Device Development

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
John W. Boretos, Physical Scientist, BEIB, DRS

John Doppman, M.D.	Radiologist	CR, CC, NIH
Edward Oldfield, M.D.	Neurosurgeon	NINCDS, NIH
F.T. Hambrecht, M.D.	Health Science Adm.	NINCDS, NIH
Richard Clark, M.D.	Heart Surgeon	NHLBI, NIH
Donald Wright, M.D.	Neurosurgeon	NINCDS, NIH

COOPERATING UNITS *(if any)*
CR, CC, NIH; NS, NINCDS, NIH;
FNP, NINCDS, NIH; S, NHLBI, NIH;
BEIB, DRS, NIH.

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Chemical Engineering

INSTITUTE AND LOCATION
DRS, NIH Bethesda, MD. 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	0.7	0.3

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of this project is to elucidate the interaction of biomaterials used for specific implants with the physiological environment and to explore specially prepared biomaterials and design features with respect to their suitability and performance in a variety of contexts. Polymers, metals and ceramics are important for use in catheters, heart assist pumps, artery cuffs, electrode insulation and similar implant applications. Variations in these materials as well as physically induced stress and environmentally accelerated degradation can severely reduce their effectiveness for long-term use as a surgical device. Previous studies undertaken by this project have shown a relationship between the molecular chain structure and resistance to hydrolysis. Recent evidence suggests that physical forces such as stress induced during fabrication can promote a form of stress corrosion. In vitro test data and SEM photomicrographs of surgical explants of various polyurethane classes show that premature failure is often the result of a combination of forces acting on the polymer at stress risers. Polymer systems and composites capable of timed dissolution offer significant advantages in the development of devices that allow natural tissues to take over as healing progresses. Tissue ingrowth into porous materials provides greater stability for specific implants. A strong correlation exists between these in vitro and in vivo observations over short and long term periods of study.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10015-11 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Development of Everting (Toposcopic) Catheter for Clinical Vascular Use

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI: D.R. Shook, Biomedical Engineer,	BEIB, DRS
J.L. Doppman, Chief,	DRD, CC
E.H. Oldfield, Chief (Acting)	SNB, NINCDS
D.L. Miller, Radiologist	DRS, CC
H.R. Keisar, Clinical Director	DIR, NHLBI

COOPERATING UNITS *(if any)*
Diagnostic Radiology, CC (J.L. Doppman, D. Miller);
Surgical Neurology, NINCDS (E.H. Oldfield)

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section,

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.1	0.1	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The everting catheter has been shown to be a reliable clinical means to catheterize long, small diameter, and highly tortuous blood vessels, inaccessible by previous techniques. An everting element evaginates from the tip of a conventional catheter. This extremely flexible polyurethane element has been fabricated in 3, 4 and 5 French sizes mated with 5, 6 and 7 French catheters, respectively, and is capable of eversion lengths in excess of 40 cm.

The catheter has been applied clinically for the local delivery of chemotherapy to brain tumors and of embolizing agents in the liver. In the former, treatment is provided by positioning the conventional catheter in the internal carotid artery from a femoral entry; everting the element through the carotid sinus, beyond the ophthalmic artery to avert retinal toxicity; and perfusing the tumor through the middle and/or anterior cerebral arteries. Note that a conventional catheter cannot safely negotiate the tortuosity of the carotid sinus. In the latter application, embolizing agents are delivered intra-arterially to block the perfusion of hepatic tumors. The sinuousity of the vessel precludes access by conventional techniques.

The catheter has been extensively used clinically in its present prototype form, and production techniques for its fabrication have been transferred to private industry to provide for a ready source of catheters for future studies.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10034-09 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Three-Dimensional Histological Reconstruction

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

S.B. Leighton, Mechanical Engineer, BEIB, DRS
A.M. Kuzirian, Neuroanatomist, LB, NINCDS

COOPERATING UNITS *(if any)*

LB NINCDS

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.2	.2	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A semi-automatic system for acquiring three-dimensional structural information about histological material is being developed. The system should have significant speed and reliability advantages over present techniques using serial sections, although resolution may be limited. In brief, an embedded tissue block will be fixed relative to a scanning electron microscope imaging system, the surface of the block will be imaged and the image stored, and successive slices will be removed by a built-in microtome. Handling and registration of thin sections will thus be eliminated. Human and computer pattern recognition will transform the resulting set of images into a three-dimensional reconstruction. Oxygen plasma etching has been found to give sufficient topographic relief that the resolution of the images is now limited by the SEM and not by the preparation technique. The images of Hermissenda Crassicornis obtained by this technique correlate well with TEM images of the same tissue, indicating that the lack of artifact is adequate for the contemplated studies.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10039-09 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Biophysical Instrumentation and Methodology

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Marc S. Lewis, Research Chemist, BEIB/DRS

Other: Thomas R. Clem, Electronics Engineer BEIB/DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Analytical Methods

INSTITUTE AND LOCATION
DRS, National Institutes of Health, MD 20892

TOTAL MAN-YEARS: 0.1	PROFESSIONAL: 0.1	OTHER:

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The project is designed to develop new instrumentation and methodology or improve existing instrumentation and methodology for characterization of biological macromolecules and for studying their interactions. Analytical ultracentrifugation, the techniques ancillary to it, and methods of data analysis using mathematical modeling appropriate for these techniques are the major areas of interest.

The major emphasis in this project has been given to the development of new applications of the techniques of mathematical modeling to problems in ultracentrifugal analysis. The two areas this project has been concerned with have been an extension of the method of implicit constraints to a wider range of studies of macromolecular interactions and a new approach toward obtaining molecular weight distributions in solutions of macromolecular biopolymers. MLAB, operating on the DEC-10 computer, has been used for the mathematical modeling. The applications of these studies are described in the annual report entitled Physical Chemistry of Biological Macromolecules.

No new work on data acquisition has been carried out except for the continuation of a study on the possibility of development of new optical data acquisition systems for the conversion of current preparative ultracentrifuges into analytical ultracentrifuges with superior capabilities as analytical instruments at a fraction of the cost of the current instruments. New preliminary designs for such systems have been developed.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10043-09 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Fiber Optic Probes

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

John I. Peterson, Chemist, BEIB/DRS
Einar Stefansson, EICB

COOPERATING UNITS *(if any)*

RVR

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Chemical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS: .8	PROFESSIONAL: .8	OTHER:

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A suitable device is needed for the direct measurement of oxygen partial pressure (PO_2) in blood and tissue for both clinical and research applications. Methods currently available for measuring PO2 lack convenience, reliability, speed, and relevance to many situations of interest. Efforts to develop electrical sensors have not been successful. It is desirable to have a very small PO2 sensor which can be inserted into a blood vessel or tissue with little disturbance, and which will provide instantaneous and current PO2 monitoring for either short or extended periods of time. A fiber optic sensor is ideal for this application, with the advantage, for physiological use, of very small size and flexibility, safety, and low cost. A PO2 sensor has been developed, based upon the principle of fluorescence quenching by oxygen. The feasibility of the sensor and its satisfactory performance has been demonstrated in in vitro and in vivo tests, in work in preceding years. In the previous year, the development of the sensor as a needle probe was accomplished, and problems of storage life and stability were resolved.

During the past year, several problems relating to development of a usable instrument and probe were solved, and the system was used for experiments to measure PO2 in the eyes of dogs. This was done in comparison with polarographic electrode measurements of PO2. The experiments were done to evaluate the suitability of the sensor for studies of diabetic retinopathy.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10096-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Light Scattering Method for Evaluation of Platelets

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. F. Bonner Physicist BEIB DRS

T.R. Clem	Elect. Engineer	BEIB DRS
S.B. Leighton	Mech. Engineer	BEIB DRS
J. Fratatoni	Dir. Blood Bank Products Branch	DBBP,CDB, FDA
B. Poindexter	Biologist	BBPB, DBBP, CDB, FDA
P. Mintz	Director	Blood Bank, U. Virginia

COOPERATING UNITS *(if any)*
Center for Drugs and Biologics, FDA
Blood Bank, U. Virginia

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronic Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.4	0.4	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

In the preceeding years of this project we have developed a unique instrument to noninvasively assess the concentration and morphology of transfusion platelets in a rapid clinically acceptable procedure. The basis of this measurement is low-angle multiple scattering of light and the changes in this signal associated with orientation of the subset of the platelet population that are discoid. The instrument, as developed, is automated under microprocessor control and calculates the clinically important values of concentration and percentage that are discoid of the platelets in transfusion bag within a 3-minute period. These highly accurate measurements are being used in a variety of research studies of the effects of various storage conditions (e.g., temperature transients, bag wall material, addition of pharmacological agents) on the condition of stored platelet concentrates.

The instrument was originally designed to play a significant role in improving the quality of platelet transfusions, by routine and accurate noninvasive assessment of platelet transfusions, by routine and accurate noninvasive assessment of platelet quality (as represented by the degree or normal platelet morphology). To this purpose ongoing studies at the Univ. of Va. Medical School Blood Bank are directed at its clinical utility and determining the degree of correlation of the noninvasive measurement with clinical efficacy of the platelet transfusion.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS-10097-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Studies in Cardiovascular Dynamics

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.S. Chadwick,	Biomedical Engineer,	BEIB, DRS
J.C. Ohayon,	Visiting Fellow,	BEIB, DRS
C. Oddou,	Professor,	University of Paris
P. Brun,	Senior Researcher,	INSERM U. 138
B. Levy	Senior Researcher,	INSERM U. 141

COOPERATING UNITS *(if any)*

INSERM U.138 U.141
University of Paris XII, Laboratory of Physical Mechanics

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.5	1.5	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Our existing model for myocardial and ventricular mechanics will be refined to include an isotropic component of elasticity, passive and active viscoelasticity, non-cylindrical geometry, pathological fiber organization, myocardial blood flow, myocardial oxygen demand, and effects of activation pattern. The model will used in conjunction with ultrasonic kinematic data to determine performance parameters. The physiological relationships between phasic coronary arterial and venous pressure and blood flow, aortic input impedance and ventricular dimensions will be determined. A mathematical and physical model of myocardial blood flow will be developed incorporating vessel collapse. Experimental techniques will be developed to measure vascular distensibility in man. RF backscatter from the myocardium will be investigated both experimentally and mathematically with the idea of determining the stress field. Theoretical models of wave propagation in arteries and aortic input impedance will be checked against experimental data.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10098-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Laser Instrumentation for Vitreous & Cardiovascular Microsurgery

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.F. Bonner	Physicist	BEIB DRS
P.D. Smith	Physicist	BEIB, DRS
M. Leon	Sr. Investigator	CB, NHLBI
S. Epstein	Chief	CB, NHLBI
D. Lu	Fellow	CB, NHLBI
R. Clark	Chief	SB, NHLBI
C. Kupfer	Director	NEI

COOPERATING UNITS *(if any)*
Clinical Branch, NEI; Optical Science Branch, Naval Research Lab;
Cardiology Branch & Surgery Branch, NHLBI;

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Electrical and Electronic Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.5	2.5	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

This program covers the long standing development of laser microsurgical techniques which initially centered on ophthalmological applications and new systems of interest in that field (Pulsed Carbon Dioxide lasers and pulsed ND:YAG slit lamp-based laser systems). Its primary focus for the last 3 years has been in cardiological application of lasers, in particular laser angioplasty. In order to develop new laser microsurigal techniques in this new field, it was necessary to analyse a variety of laser sources and their tissue effects and the feasibility of transmission through flexible fiber optics. New sources such as Erbium:YAG (YLF) lasers coupled to zirconium fluoride optical fibers and excimer lasers coupled to fused silica fibers were examined as well as more conventional sources (pulsed carbon dioxide and Nd:YAG lasers, and continuous wave argon and dye lasers).

In collaboration with the Naval Research Lab, we have developed the new eribium laser microsurgery technology through feasability studies to the development of hte initial microsurigal prototype using zirconium fluoride fibers. Refinement of this system is primarily directed towards intravascular ablation (laser angioplasty) but include application to intraocular surgery (particularly vitreal and corneal transplantation), destruction of renal stones, and endoscopic microsurgery.

Parallel development of excimer microsurgery has evaluated state-of-the-art technology and provided a research microsurgical system for in vivo studies.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10099-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Cochlear Mechanics and Hair Cell Transduction

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.S Chadwick,	Biomedical Engineer	BEIB, DRS
J. Rinzel,	Chief	MRB, NIADDK
S. Shamma,	Assistant Prof.	Univ. of MD, Dept. of Electrical Engineering
K. Morrish	Staff Fellow	MRB, NIADDK

COOPERATING UNITS *(if any)*

NIADDK, Mathematical Research Branch
Univ. of Maryland, Dept. of Electrical Engineering

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.25	0.25	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A mathematical model of cochlear processing is developed to account for the nonlinear dependence of frequency selectivity on intensity in inner hair cell and auditory nerve fiber responses. The model describes the transformation from acoustic stimulus to intracellular hair cell potentials in the cochlea. It incorporates a linear formulation of basilar membrane mechanics and subtectorial fluid-cilia displacement coupling, and a simplified description of the inner hair cell nonlinear transduction process. The analysis at this stage is restricted to relatively low frequency single tones. The computed responses to single tone inputs exhibit the experimentally observed nonlinear effects of increasing intensity such as the increase in the bandwidth of frequency selectivity and the downward shift of the best frequency. In the model the first effect is primarily due to the saturating effect of the hair cell nonlinearity. The second results from the combined effects of both the nonlinearity and the inner hair cell lowpass transfer function. In contrast to these shifts along the frequency axis, the model does not exhibit intensity dependent shifts of the spatial location along the cochlea of the peak response for a given single tone. The observed shifts therefore do not contradict an intensity invariant tonotopic code.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10103-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Triple Laser-Multi Parameter Flow Cytometry System for Study of Tumor Cell Kinetics

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

W. Schuette	Chief, ACES	BEIB, DRS
S. Shackney	Allegheny Gen. Hosp.	Pittsburgh, PA 15212
J. Dvorak	LPD-NIAID	
F. Plowman	ACES	BEID, DRS

COOPERATING UNITS *(if any)*

DRS-NCI
LPD-NIAID

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
3.0	2.0	1.0

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A Triple laser flow cytometer has been developed so that various immuno-fluorescent labeling techniques may be employed for the investigation of cell kinetics. Three laser beams at different wave lengths are made to intersect a tumor cell flow stream passing through a quartz cuvette so that multi-parameter signals may be obtained. These signals are processed by specialized electronics and then analyzed by means of a PDP 11 computer. Simplified optics have increased light detection efficiency by an order of magnitude. The system is currently being used for the investigation of a unicellular protozoon known as trypanosoma cruzi, the causative agent of Chagas disease. Electronic cell volume capability has been added to the system to assist in the bivariate analysis of trypanosoma cruzi fluorescence data.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10109-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Adjunctive Heat Treatment of Cancer

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.L. Levin, Biomedical Engineer, BEIB, DRS
M. Hagmann, Senior Staff Fellow, BEIB, DRS
J-L Guerquin-Kern, Fogarty Fellow, BEIB, DRS
C. Charny, Guest Worker, BEIB, DRS
H. Coldefy, Fogarty Fellow, BEIB, DRS
A. Zabel, Physician, ROB, NCI
E.J. Glatstein, Chief, ROB, NCI

COOPERATING UNITS *(if any)*

Radiation Oncology Branch, NCI

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section,

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: 4.2	PROFESSIONAL: 4.2	OTHER:

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of this project is to facilitate the development of adjunct hyperthermia modalities for cancer treatment by theoretically and experimentally studying the spatial and temporal variation in the temperature field of tissues subjected to microwave and radio-frequency electromagnetic radiation. Currently, we are (1) experimentally measuring the patterns of energy deposition within various types of extremity phantoms produced by a Mini-Annular Phased Array (MAPA) applicator; (2) theoretically describing the electromagnetic fields of a MAPA in terms of its design paramters; (3) theoretically describing the transient thermal profiles within limbs produced by a MAPA; and (4) theoretically describing the systemic temperature and cardiac changes associated with heating various regions of the body. We are also performing electromagnetic and thermal modeling of the unwanted non-local energy deposition occuring outside the bounds of typical hyperthermia applicators. These studies are forming the basis for the clinical system currently under construction.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10110-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
A Dual 3-Dimensional Position Monitor For Speech Analysis: MOD. II

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

E.C. Walker, Mechanical Engineer, ACES BEIB

Other Investigators
T.L. Talbot, Mechanical Engineer ACES BEIB
C.L. Ludlow, LCD NINCDS
F. Plowman, ACES, BEIB

COOPERATING UNITS *(if any)*
LCD-NINCDS

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS: .25	PROFESSIONAL: .25	OTHER:

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Several speech monitoring instruments have been designed to study the etiology of normal and abnormal articular movements in humans. The first system, which is in current use, provided a unique method of monitoring 3-D lip and jaw movements. The second system, MOD II, is an improved version of the first. The device consists of two mirror image transducers mounted on a common head frame. Each transducer, which can be individually adjusted, is capable of measuring the movement of a point in three orthogonal planes. The transducers have been structurally and operationally redesigned to provide increased linearity, resolution, and reduced weight. Additionally, the head frame has been totally redesigned to provide improved wearing comfort and reduced weight. The improved system will facilitate studying a broader patient population such as children and the elderly.

Design and fabrication of MOD II has been completed. Results of bench tests indicate that the system performs well, within its specified range. Future efforts will be directed toward patient testing.

Following system enhancement, patient testing will be scheduled for the upcoming fiscal year.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10112-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Analysis of Microcirculatory Blood Flow by Laser Doppler Scattering

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
R.F. Bonner, Physicist, BEIB, DRS
T.R. Clem, Elect. Engineer, BEIB, DRS
M. Kaliner, Section Chief LCI NIAID
H. Druce, Clinical Assoc. LCI NIAID
G. Rogers, Clinical Assoc. LCI NIADDK
M. Roy, Visiting Scientist NEI
D. Goldstein, Sr. Invest. HB NHLBI; H. Kaiser, Chief HB NHLBI
E. Oldfield, Neurosurgeon SN NINCDS; R. Blacklock, Clinical Assoc. SN NINCDS

COOPERATING UNITS *(if any)* HB, NHLBI; CB NEI; LCI, NIAID; ROB, NCI; SN, NINCDS; LAP, DCRT; MedPacific,Inc, Seattle,WA; TSI, Inc, St. Paul,MI; International Diabetes Center, Minneapolis, MI; Neurology and Gastroenterology Depts., USUHS, Bethesda, MD,Dept. Medicine, Med. Coll. S. Carolina, Charleston, SC.

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Electrical and Electronic Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	1.0	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

This project has developed a clinically useful method (Laser Doppler instrument and its theory of operation) for clinical measurements of microcirculatory blood flow, number density of flowing RBC's, and mean RBC velocity. Assistance has been given to the commercialization of this methodology and its application to clinical research in many laboratories worldwide. At the NIH our clinical studies have been directed to examining normal and abnormal microvascular dynamics through noninvasive clinical studies (of skin and nasal mucosa) and in intra-operative clinical studies (of muscle and CNS). Collaboration with USUHS is directed at developing endoscopic application of this technology. Considerable theoretical work has been directed toward an adequate construct with which to intercept the physical measurements and refining the accuracy of the microcirculatory measurements. We have discovered abnormal microcirculatory patterns and responses in the skin of patients with sickle cell disease, hypertension, certain cardiac circulatory syndromes, diabetes and skin cancer. The microcirculatory effects of therapy are monitored with this technique in these patients affording a better understanding of the microcirculatory component of these diseases.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10116-05 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Modeling of Arterial Pulse Waves

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.S. Chadwick,	Biomedical Engineer,	BEIB,DRS
D. Goldstein,	Senior Investigator	EHL, NHLBI
H. Kaiser,	Chief EHL,	NHLBI

COOPERATING UNITS *(if any)*
NHLBI, Endocrine-Hypertension Laboratory

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.25	.25	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
 ☐ (a1) Minors
 ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A pulse wave theory and a model of the human brachial arterial system is developed that predicts the changes in the arterial pressure waveforms as it traverses the vasculature - increased pulse, sharper main wave, disappearance of the aortic incisura, and appearance of a diastolic dicrotic wave. It also predicts the observed modulation of the waveform during phenylephrine - induced vasoconstriction and nitroglycerin - induced vasodilation. The model considers the brachial arterial system as a tapered distensible tube ending in a loop, with side branch networks represented by distributed Windkessels, and it uses verifiable values for realistic parameters. We found that the vertical modulation of the dicrotic wave in people decreased with advancing age and with high blood pressure, the model explaining these finding in terms of increasing vascular rigidity and decreasing small vessel vasodilator responsiveness. We noted a significant negative correlation between the arterial level of plasma norepinephrine and the amount of modulation of the dicrotic wave after nitroglycerin among subjects 40 years old or younger, suggesting a sympathetic neurogenic contribution to the vascular abnormalities observed in relatively young patients with essential hypertension.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10122-05 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Micro-computer Applications for the NIH Bio-Technology Unit (Pilot Plant)

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

T.R. Clem, Sr., Electronics Engineer, EEES, BEIB, DRS

Other Investigators:

Y. Shiloach	Chief, Bio-Technology Unit	LCDB NIADDK
A. LeRoy	Chemical Engineer	BEIB, DRS

COOPERATING UNITS *(if any)*

LCDB - NIADDK

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	0.75	0.25

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The NIH Bio-Technology Unit (Pilot Plant) has various instrumentation needs that have not been previously addressed or are currently using cumbersome techniques and/or outdated equipment. This project has been concerned with satisfying these instrumentation needs using modern equipment and low cost desktop size Personal Computers. Several PC's have been acquired and are being installed to supply a variety of services which include process control, data acquisition, data analysis, and administrative functions. The instrumentation and process control functions utilize commercial equipment, such as possible, and are interfaced using standard I/O connections such as the IEEE-488 GPIB and the RS-232 Serial I/O ports.

Using these techniques allows changes in the parameters measured or controlled, or scaling to different size vessels to be accomplished relatively quickly and easily. Utilizing the computational capabilities of the computer/controller allows initial selection of the operating parameters and dynamic alteration of these parameters as the process continues, thus allowing optimization of yields or detailed study of the process parameters.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10132-05 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT (80 characters or less. Title must fit on one line between the borders.)

Image Processing and Cell Classification

PRINCIPAL INVESTIGATOR (List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)

J.R. Ellis	Expert	BEIB, DRS
C.C. Gibson	Electronics Engineer	BEIB, DRS
M.A. Greenwood		SNB, NINCDS
G.H. Hook		SNB, NINCDS

COOPERATING UNITS (if any)

SNB, NINCDS

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Office of the Chief

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.25	0.15	0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK (Use standard unreduced type. Do not exceed the space provided.)

In vitro cell culture is an effective method for the study of the effects of chemotherapeutic agents on neurological tumors. Quantitation of all but the most rudimentary of these effects is generally beyond the ability of human observers. Thus, an automated system for acquisition of image data, extraction of parameters of interest, and statistical processing of results is necessary for any quantitative effectiveness.

Historically, this field has been qualitative. Thus, moving toward quantitative evaluations has involved a very broad spectrum of discussions about methods, limitations of methods, desired results, and significance of results. In addition, it has been necessary to clarify the strong and weak points of human and automated image processing, and to determine those problems which require a combination of the two methods.

Morphology studies using size, aspect ratio, and a shape factor were begun some time ago on micrographs of granules and mitochondria of Glioma tumor cell lines treated in-vitro with AZQ, BCNU, and other drugs. These studies have recently been resurrected.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10146-04 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Prosthetic Urethral Sphincter

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

S. B. Leighton, Mechanical Engineer, BEIB, DRS,
Steven Scoog, M.D. WRAMC
T. Rade Baugh, BRCM, NIA

COOPERATING UNITS *(if any)*
BRCM, NIA
DCT, NCI

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section,

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: .05	PROFESSIONAL: .05	OTHER: 0

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
 ☐ (a1) Minors
 ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A number of techniques are used for treating urinary incontinence, including a number of artificial prosthetic sphincters. The present work concerns an entirely intraurethral artificial sphincter that can be implanted without surgery. Concepts are being explored which would allow the device to be used in situations in which surgery is contraindicated, and would also presumably lower the cost. The valve would be appropriately matched to urethral dimensions, pressures, and flowrates. The valve would be potentially useful in cases of nonopening normal valves as well as in cases of non-closing valves.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10151-04 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Nuclear Magnetic Resonance Imaging

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Dr. David I. Hoult, Physical Scientist, BEIB, DRS

Other personnel:
Dr. Ching-Nien Chen, Expert
Dr. Victor J. Sank, Expert
Dr. L. Kyle Hedges, Staff fellow

COOPERATING UNITS *(if any)*
Department of Radiology, Clinical Center

LAB/BRANCH
NMR Imaging Laboratory, Biomedical Engineering and Instrumentation

SECTION
Office of the Chief

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
3.0	2.8	0.2

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A considerable amount of work has been put into the rf probe design for the 3-dimensional rotating frame NMR imaging method, at 5 MHz, as an extension from our previous 2D projects. Because of limitation in geometry, the coils interact strongly rendering impossible individual tuning and matching by conventional means. We have successfully devised circuits to overcome these difficulties. The same principle can be utilized in other similarly coupled rf coils. Existing softwares are modified and expanded to accommodate the new hardware for data collection and reduction.

A FORTRAN program package is being developed to give numerical solutions to the Bloch-Riccati equations for arbitrary rf pulses.

A preliminary investigation has been conducted with regard to spectral treatment by the maximum entropy method, which has been introduced to the NMR field recently to improve the signal-to-noise ratio.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10156-04 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Differential Scanning Calorimeter

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.P. Mudd, Biomedical Engineer, ACES, BEIB, DRS
T. Talbot, Mechanical Engineer, ACES, BEIB, DRS
P.D. Ross, Physical Chemist, A LMB, NIADDK

COOPERATING UNITS *(if any)*
A LMB, NIADDK

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda. MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.3	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The application of sensor design techniques from earlier work in heat conduction calorimeters to scanning calorimeter design has resulted in a scanning calorimeter which has a 10-fold increase in its effective sensitivity. Unfortunately, the high temperature scanning associated with this calorimeter has produced unexplained and random failures in the thermopiles which create an unacceptable increase in the baseline noise. Since these sensors are manufactured for use as heat pumps (Peltier mode of operation) and not sensors (Seebeck mode of operation), the manufacturers can supply no information on expected noise performance. We have therefore initiated a program to evaluate the noise and failure modes of these devices from different manufacturers. In the process of evaluating these devices, we will also measure their Seebeck sensitivity as an aid in matching the channel sensitivities in the scanning calorimeter.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10157-03

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Temperature Controlled Chamber for X-ray Diffraction Specimens

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
C.P. Mudd, Biomedical Engineer, ACES, BEIB, DRS
H.W. Tipton, Mechanical Engineering Tech., ACES, BEIB, DRS
A.V. Parsegian, Researcher, CR, PSL
B.K. Lee, Researcher, CR, PSL
D. Rau, A, LCP

COOPERATING UNITS *(if any)*
DCRT. Cr-PSL

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.2	0.2	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A prototype chamber was constructed of polycarbonate and aluminum with a beryllium window to allow the entry of the x-ray beam. The cell containing the specimen is loaded into a holder next to the window. The bottom of the holder is held in contact with one side of a Peltier solid state heat pump. The opposite side of the heat pump is clamped to the aluminium bottom of the chamber which serves as the heat sink. In this early version, a thermistor was used to control the heat pump to keep the specimen at the set temperature. The film plate is mounted inside the chamber on an adjustable slide. Based on the success of this prototype, two more chambers were requested with different focal lengths. The new units were designed with an improved temperature controller. The new unit incorporates a linear feedback sensor with a bipolar supply to allow automatic switching from cooling to heating. The set temperature is fixed by a 3 digit thumbwheel switch and the sample temperature is read out on a $3^1/2$ digit display. This new sytem will hold the sample temperature between -3°C and 85°C with a stability of 0.02° C.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10159-05 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Pathophysiology of Cachexia in Sarcoma Patients

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
R. Corsey, Electronic Engineer BEIB, DRS

J.A. Norton, Section Chief, SURG, NCI
R. Inculet, Research Associate, NCI

COOPERATING UNITS *(if any)*
Nutrition Department,Clinical Center, NIH
Nursing Department, Clinical Center, NIH

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: 2.0	PROFESSIONAL: 1.5	OTHER: 0.5

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☒ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

This study is designed to explore alterations in metabolic demand which sarcomas imposed on patients. Since soft-tissue sarcomas have been shown to be metabolically active tumors and NCI is treating a large number of patients with extremity and truncal sarcomas this study will be limited to sarcoma patients. Of particular interest is the following:

1. Is there any alteration in resting energy expenditure due to the presence of the tumor?

2. Is there any alteration in body cell mass prior to the onset of cachexia?

Previous studies have been limited to very sick patients or small numbers of patients. This study will attempt to further our understandig of the pathophysiology of covert cachexia before it becomes clinically evident. Patients and volunteers will be matched with respect to age, sex, and body surface area.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10162-04 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Wound Healing: Biology and Rheology

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Thomas L. Talbot, MS, ACES, BEIB
Walter T. Lawrence M.D., C. Surgery, NCI
Lawrence E. Thibault, ScD. Bioengineering Dept, Univ. of Pa

COOPERATING UNITS *(if any)*
NCI, University of Pa, Philadelphia, Pa

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.2	1	0.2

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Preliminary studies have been completed with swine models. These studies involved stamping an indelible grid (10cmx10cm) on the skin of the swine, and the excision of a 1 cm by 10 cm strip of the skin out of the grid area, and finally approximating the incision edges with silk sutures. Photographs of the grid were taken before excision, after excision, and after suturing. These photographs will be analyzed to determine the impressed strain on the wound closure and eventually relate this information to wound breaking strength (WBS).

Studies based on a rat model that relate biologic and pharmacologic interventions to WBS have been completed. Certain groups were treated pharmacologically during the wound healing process. Significant decrease in WBS was observed in these groups as compared to control groups. Further studies will include the comparison of tumor bearing group to control groups.

Rats treated with 8 mg/kg Adriamycin prior to or on the day of wounding demonstrated decreased wound breaking strength in incisional wounds at all intervals after wounding. Decreased amounts of collagen and DNA, lower mitotic rates, and decreased cellularity were noted in wound chambers from rats treated in this manner. In both the incisional wound and wound chamber models, rats treated with Adriamycin seven days after wounding showed a less dramatic healing impairment. No differences in collagen type were noted between chambers from the Adriamycin treated and untreated rats. The data suggest that deficient quantities of platelet, macrophage, and lymphocyte factors; a decreased rate of collagen synthesis, and impaired collagen remodelling all contribute to the Adriamycin induced healing impairment.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10163-04 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Magnetoencephalographic Localization of Foci of Neurologic Activity

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	P.D. Smith	Physicist	BEIB	DRS
others	J.L. White	Electronic Eng.	BEIB	DRS
	W.S. Friauf	Chief	BEIB	DRS
	S. Sato	Neurologist	OCD	NINCDS
	D. Rose	Clinical Assoc.	MNB	NINCDS
	R. Porter	Chief	MNB	NINCDS

COOPERATING UNITS *(if any)*
Medical Neurology Branch, NINCDS

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.5	1.5	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

SQUID magnetometers have been used to study the magnetic activity associated with spike discharges occurring in interictal periods in patients with temporal lobe epilepsy. Magnetic field maps associated with specific spike discharges were obtained from measurements made with the SQUID at various locations on the skull. Mathematical models, which accounted for the head shape of the patient and the orientation of the SQUID, were developed to calculate the predicted magnetic field maps. These comparisons of the experimental and theoretical data indicate close agreement in some areas, but significant deviations in others, which are not explained by skull topography alone. A seven-channel SQUID has been obtained and is being evaluated.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10170-04 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Biological Applications of a Computer Controlled Analytical Electron Microscope

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.D. Leapman	Visiting Scientist	BEIB, DRS
Others:		
C.E. Fiori	Physical Scientist	BEIB, DRS
C.R. Swyt	Physical Scientist	BEIB, DRS
K.E. Gorlen	Electronic Engineer	CSL, DCRT
C.C. Gibson	Electronic Engineer	BEIB, DCRT

COOPERATING UNITS *(if any)*
CSLT, DCRT

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.5	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Analytical methods have been developed and applied to electron energy loss spectra (EELS) and energy-dispersive X-ray spectra (EDXS) as well as their corresponding two-dimensional elemental maps produced by the computer-controlled analytical electron microscope in BEIB. Deconvolution algorithms developed earlier in the group have been applied to EELS spectra from cryosections of rapidly-frozen chromaffin cells in order to remove effects of plural inelastic scattering and to increase visibility of weak spectral features. In EELS elemental maps counting statistics are not high enough for a complete removal of plural inelastic scattering but sample-thickness effects can be corrected to first order by dividing the core loss signal by the zero-loss signal. Different algorithms for handling X-ray spectra have also been developed and comparison made in terms of accuracy and speed.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10184-03 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Physical Chemistry of Biological Macromolecules

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Marc S. Lewis	Research Chemist	BEIB/DRS
S.I. Chung	Research Chemist	LB NIDR
C.B. Klee	Section Chief	LB NCI
R.E. Lippoldt	HSO Dir., USPHS	CEB NIDDK
S.W. Luborsky	Research Chemist	DCBD NCI
K. Prasad	Visiting Fellow	CEB NIDDK
R.J. Youle	Research Chemist	SNB NINCDS

COOPERATING UNITS *(if any)*
LB/NIDR, LBDA/NIDR, SNB/NINCDS

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Analytical Methods

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.9	0.9	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of this project is to study the physical properties of a wide variety of biological macromolecules with the goal of correlating these properties to the structure and function of the macromolecules. The emphasis is on the thermodynamics of the interactions of these macromolecules and on their molecular size and shape. Analytical ultracentrifugation and mathematical modeling are the principal research techniques used.

Studies on the association of fibrinogen with other proteins involved in blood clotting and fibrinolysis have been continued and currently deal with the association of fibrinogen with plasma and platelet Factor XIII and with the association of plasminogen with the D and E fragments of fibrinogen.

Research on ricin has involved studies on a monoclonal antibody to the ricin B chain, the interaction of this antibody with ricin, and its effect on ricin toxicity both in vitro and in vivo. Research on the 27 S intermediate form of clathrin involved studies on the mechanism of formation of this form of clathrin and its relationship to the formation of clathrin baskets.

Studies on synapsin have been directed toward determining the molecular weight of the monomeric form of this protein and determining whether the aggregation which it undergoes is reversible, irreversible or a combination of both. Studies on cell adhesion peptides have been directed toward determining their mode of self-association, measuring the thermodynamic parameters characterizing their self-association, examining their possible interactions with each other and attempting to establish a relationship between their associative behavior and their primary structure.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10185-03 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Interventional Catheter Development

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

John W. Boretos, Physical Scientist, BEIB, DRS

Others:

John Doppman, M.D.	Radiologist	CR, CC, NIH
Edward Oldfield, M.D.	Neurosurgeon	NINCDS, NIH
Robert L. Dedrick, Ph.D.	Chem. Engr.	BEIB, DRS, NIH

COOPERATING UNITS *(if any)*
CR, CC, NIH; NS, NINCDS, NIH,
BEIB, DRS, NIH

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Chemical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.4	0.7	0.7

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of the project is to develop a catheter system for interventional radiology which is capable of traversing small and branching blood vessels (i.e. 1.5 to 4.0 mm) to reach the proximity of tumors and to administer chemotherapeutic drugs to these tumors in a controlled manner. A major obstacle to effective treatment is thought to be maldistribution of the drug at the site due to inadequate mixing with the blood. A multi-lumen catheter, which is propelled and directed through these small blood vessels via jets of fluid emanating from its distal end, continues to show promise for negotiating heretofore difficult to reach areas. Fluid turbulence generated by drug emanating at retrograde angles from the tip of the catheter adds significantly to the mixing of the drug within the blood stream. Animal tests have substantiated the feasibility of the catheter system for clinical use. A transparent model of the vascular network simulating blood flow of a pulsatile nature was designed to evaluate the efficiency of the jet flow at various delivering rates. A high torque roller pump using custom designed polyurethane tubing is capable of producing satisfactory infusion rates over an 8 hour period.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10187-03 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Mixing Studies during Infusion via Catheter

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.J. Lutz	DRS, BEIB	J. Boretos	DRS BEIB
R.L. Dedrick	DRS, BEIB	M. Bretz	DRS, BEIB
E. Oldfield	NINCDS, IR, SN	C. McClure	DRS, BEIB
J. Doppman	CC, DR		
D. Miller	CC, DR		
J. Collins	CC, DR		

COOPERATING UNITS *(if any)*
NINCDS
CC

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Chemical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.0	1.0	1.0

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Intravascular catheterization is a very common method of drug adminstration. Proper utilization of catheters requires knowledge of the physio-chemistry of the drugs in solution, the relevant pharmacokinetics of drug disposition, and in some instances the fluid mechanical events that occur as solutions are infused into the blood stream. For example, intra-arterial chemotherapy offers an alternative to systemic (iv) chemotherapy for localized neoplasms. Infusion of chemotherapeutic agents directly into the arterial supply of a tumor can allow high local drug concentrations in the tumor-bearing tissue while minimizing systemic toxicity. Application of this procedure in patients has produced varied results. For example, intracarotid infusions of cisplatin and BCNU have shown some evidence of regression of glioblastomas, but have also resulted in frequent episodes of leukoencephalopathies and other focal lesions, such as ophthalmic toxicity. These findings suggest the influence of streaming of the drug solutions from the catheter tip and inadequate mixing and distribution to distal tissue regions. This hypothesis was verified in an in-vitro flow model of the human carotid artery system. The results of dye injection studies indicated that streaming is likely to occur during low infusion rates, and that mixing can be enhanced by increasing infusion velocities, by improving catheter tip design, and also by modifying the mode of injection such as infusing transverse or retrograde to the blood flow.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10191-03 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Continuous Optical Monitoring for Bacterial Cultures

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

G.M. Maxwell	Staff Fellow	BEIB, DRS
S.B. Leighton	Senior Engineer	BEIB, DRS
Ernst Freese	Chief	LMB, NINCDS
S.A. Robrish	Scientist	LMI, NIDR
Y. Shiloch	Chief, Pilot Plant	LCDB, NIADDK

COOPERATING UNITS *(if any)*
LMB, NINCDS
LMI, NIDR
LCDB, NIADDK

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section,

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.3	.3	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The incubation of bacterial cultures is a standard laboratory technique in numerous biological studies. Monitoring the growth of these cultures in a shaker bath or fermenter currently requires frequent manual sampling. The work on this project has been aimed at developing a system capable of continuously monitoring growth in situ using optical measurement techniques.

To date the work has demonstrated the feasibility of making these measurements in shaker flasks employing an immersed detection system and yielded a prototype system for this application. Additional efforts have been directed at designing a system which will operate in a commercial type fermenter. The principal problem of eliminating gas bubbles in the optical path of the immersed probe has been solved.

The shaker flask probe consist of a light emitting diode and a photodetector mounted a right angles to one another in a fixed submersible head. Readings are taken at intervals of one minute under control of a computer system which also collects and process data.

The fermenter probe is of a similar design except that the optics are kept in a bubble free region of the housing.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10193-03 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Development of Everting Toposcopic Catheter for Clinical Gastroenterological Use

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

D.R. Shook, Biomedical Engineer, BEIB,DRS

COOPERATING UNITS *(if any)*

Georgetown University Medical Center (E.L. Cattau); Esophageal, Gastric and Colonic Diseases, Digestive Diseases and Nutrition Division, NIADDKD (K.J. Vener).

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Mechanical Engineering Section,

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.2	0.2	

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The unique characteristics of the everting catheter have suggested its application in the gastrointestinal system. The operation of the catheter promises to facilitate the catheterization of the pancreatobiliary ducts through the Papilla of Vater. An initial series of patients has undergone routine endoscopic retrograde cholangiopancreatography (ERCP) using the catheter for contrast infusion. An extensively modified catheter is passed through an appropriately positioned endoscope. The catheter tip is placed within the ampulla, and the element is everted. In basic ERCP, contrast medium is then injected for diagnostic procedures. Catheter modifications include an overall lengthening to approximately 200 cm, while eliminating any added length to the everting element beyond that required by the clinical procedure. This keeps frictional drag of the element to a minimum. Where kinking of the tip of the primary catheter in the elevator of the scope presents a problem, reinforcement of the tip or a change to PTFE materials is made. In addition, the catheter's ability to atraumatically negotiate small, tortuous ducts is being investigated for catheterization of remote pancreatic and cystic ducts for sampling of pure secretions, placement of biliary stents, and conveyance of CCD television cameras.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10194-03 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Optimized Polymer Processing for Advanced Catheter Development

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

D.R. Shook, Biomedical Engineer, BEIB, DRS

COOPERATING UNITS *(if any)*
Diagnostic Radiology, CC (J.L. Doppman); Esophogeal, Gastric and Colonic Diseases, Digestive Diseases and Nutrition Division, NIADDKD (K.S. Vener)

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.05	0.05	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Advanced techniques of plasticating extrusion can produce materials of optimized anisotropic properties and very fine dimensional characteristics. Availability of such materials then supports development of unique polymeric medical devices, such as the everting catheter. Unique polymer resins are first characterized specifically for extrusion characteristics, and predictive models of rheological behavior are constructed. Die designs can now be implemented to take advantage of unique polymer character and to overcome the most critical processing difficulties. The models may also be used to eliminate certain polymers from consideration. Current efforts are to optimize the catheter material for maximally safe operation and to allow development for arterial dilatation.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10201-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Automated Cell Colony Scanner System

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Dr. Seth Goldstein, Chief, Mechanical Engineering Section, BEIB, DRS
Dr. Michael Brownstein, Chief, Laboratory of Cell Biology, NIMH

COOPERATING UNITS *(if any)*

Laboratory of Cell Biology, NIMH

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	.7	.3

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A system is being developed for the purpose of identifying, for subsequent cloning, a minute fraction of cells possessing a specific antibody or other fluorescent tag. Major emphasis will be put on making the system as simple and inexpensive and readily available to investigators as possible. A variety of concepts and techniques were identified and evaluated, and the most promising has been developed into a computer controlled instrument.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10202-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Optical Techniques for Dental Instrumentation

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
G.M. Maxwell, Senior Staff Fellow, BEIB, DRS
R.L. Webber, Chief, CIB, NIDR

COOPERATING UNITS *(if any)*
CIB, NIDR

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: .3	PROFESSIONAL: .3	OTHER:

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

An issue of importance in clinical dentistry is the assessment of a tooth's viability. Because of the inherent difficulties in current methods of assessment, optical techniques are being explored as alternatives. Tooth viability is being examined by developing a system which can detect the presence of hemoglobin in the tooth by its absorption characteristics at 585 nm. This system uses a high intensity halogen light source and two narrow band interference filters to measure the ratio of the light intensity exiting the tooth at 585 nm to that at 595 nm. Light is delivered to the tooth by a fiber optic bundle and collected by a bifurcated bundle. An analogue divider continuously computes and displays the ratio of light intensity at the two wavelengths.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10203-02 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Clinical Assessment of Arterial Mechanical Properties

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

G.M. Maxwell, Senior Staff Fellow, BEIB, DRS
R. Chadwick, Biomedical Engineer, BEIB, DRS
D. Goldstein, Senior Investigator, IR, HE, NHLBI

COOPERATING UNITS *(if any)*

IR HE, NHLBI

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: .3	PROFESSIONAL: .3	OTHER:

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of this research is to develop an appropriate instrumentation system and associated data analysis techniques for evaluating the in-vivo mechanical properties of the brachial artery. Of particular interest is arterial distensibility, which can be evaluated in several ways. The most straightforward technique involves simultaneous measurement of arterial pressure and vessel diameter. An indirect and qualitative approach is also possible by analysis of the velocity waveform, a technique which can be performed non-invasively. Additionally, there are several theoretical formulations for arterial distensibility. Work on this project will be directed towards evaluating these various techniques to determine the limitations and advantages of each and to develop an instrumentation system suitable for routine clinical assessment of arterial mechanical properties.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10204-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Cell Handling Studies

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
S.B. Leighton, Mechanical Engineer, BEIB, DRS
J.A. Berzofsky M.D., DCBD, NCI

COOPERATING UNITS *(if any)*
DCBD, NCI

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS: .3	PROFESSIONAL: .3	OTHER:

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

It is desireable to handle and process individual cells for monoclonal antibody work and other research endeavors. We are investigating a number of modalities for this, including flow cytometry, micromanipulators, dielectrophoresis, micropipettes, microtitre trays, and tissue culture techniques. We are considering sorting, storing, transporting and selectively inactivating cells. In addition, we are considering magnetic, gradient density, antigen-antibody, and solubility difference methods as possible candidates for separation techniques.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10205-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Constant Shear Field Apparatus for ESR Studies

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
S.B. Leighton, Mechanical Engineer, BEIB, DRS
H. Kon, Research Chemist, LCP, NIADDK

COOPERATING UNITS *(if any)*
LCP, NIADDK

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.2	.1	.1

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Electron Spin Resonance (ESR) is a valuable technique for studying membrane bound proteins. In particular, it can be used to study labeled proteins in red blood cell membranes. In order to know the orientations of the proteins with respect to the membranes, it is necessary to orient the membranes with respect to the ESR device. A fluid shear field serves the purpose of orientation, since the red blood cells are discoid and distensible. However, flow in capillary tubes, although functional and simple, provides a non-uniform shear field due to the Poiseuille velocity distribution. We are planning to use a moving thin polyester tape to create a uniform shear field and hence sharper resolution of orientation and a better signal to noise ratio.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10206-02 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Concentration Uniformity by Diastolic Phasing of Pulsed Intra-Arterial Infusions

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

D.R. Shook, Biomedical Engineer, BEIB, DRS
J.L. Doppman, Chief, DRD, CC

COOPERATING UNITS *(if any)*

Diagnostic Radiology, CC (J.L. Doppman); Chemical Engineering Section, BEIB, DRS (R.J. Lutz)

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.00	0.55	0.45

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Inadequate infusate/blood mixing during intra-arterial chemotherapy at low catheter infusion rates (1 ml/min) produces highly nonuniform downstream drug concentrations. Inadequate treatment of the lesion and overexposure of normal tissues may result. Studies are underway to investigate the advantage of diastolically phased, high flow rate, pulsed intra-arterial infusions in effecting uniform downstream concentrations. Triggered by the ECG, a high velocity pulse during the interval of lowest blood velocity and retriggered on successive cardiac cycles, will yield average flow rates at the desired therapeutic value. Apparatus to produce that pulsed flow and methods of in vivo evaluation of downstream concentration uniformity are being developed. Highly realistic flow studies in an accurate model of the superior carotid artery and cerebral branches have demonstrated high essentially complete concentration uniformity as determined by spectrophotometric comparison of infusate dye concentrations in all downstream branches. The apparatus has been optimized for animal and clinical use, and pulsed intra-arterial infusions have been used in low flow rate clinical chemotherapeutic treatments, and in amimals for clinical evaluation.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10207-02 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Clinical Engineering Program for the Clinical Center Patient Areas

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. Corsey, Electronic Engineer, ACES, BEIB
L. Eldridge, Associate Hospital Administrator, CC
C. Strong, Environmental Safety Officer, CC
J. Harrison, Building Services Manager, CC
R. Bruun, Associate Hospital Administrator, CC
J. Decker, Director, CC
S. Galen, Associate Hospital Administrator, CC

COOPERATING UNITS *(if any)*

Clinical Care Instrumentation Section, DRS, NIH
Nursing Department, CC, NIH

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.4	0.15	0.25

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A comprehensive program of clinical engineering is provided for all patient-care areas of the Clinical Center. This consists of selecting equipment testing standards, designing test equipment, performing safety and performance tests, assuring hospital compliance with applicable standards of the Joint Commission on Accreditation of Hospitals, assuring hospital compliance with other pertinent standards such as the National Electric Code and the Standard for Health Care Facilities,investigating electric shocks to patients and employees, providing engineering expertise to hospital standing committees such as the Clinical Center Safety Committee and the Clinical Center Standardization Committee (equipment), providing education in the form of lectures seminars and "in service" demonstrations, designing and modifying equipment for clinical and research use, correcting equipment malfunctions through interface with manufacturers and the Center for Devices and Radiological Health, FDA, and the Emergency Care Research Institute and participation in patient care product recalls and seizures.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10208-02 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Hemodynamic Principles in the Control of Coronary Blood Flow

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Thomas L. Talbot, MS, ACES, BEIB
Stephen E. Epstein, M.D. Cardiology, NHLBI
Richard O. Cannon, III, M.D. Cardiology, NHLBI

COOPERATING UNITS *(if any)*

Cardiology Branch, NHLBI

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.75	.75	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The effects of atherosclerotic epicardial stenosis on coronary vascular resistance can be understood in terms of basic fluid mechanical principles. Resistance is directly related to the trans-stenotic pressure drop and inversely related to flow. However, even with a fixed anatomic stenosis, resistance is not fixed; it increases as trans-stenotic flow increases. This exacerbates the pressure drop across the stenosis that develops as a result of flow; at high flows, large pressure drops can occur. This characteristic of flow through stenotic lesions can contribute to a "steal" physiology, between either epicardial or intramural coronary arteries. Studies have also shown the clinical importance and influence of dynamic alterations in coronary resistance, occurring either at the large or small vessel level. In addition, compressive forces exerted by the myocardium or by elevated intraventricular pressures can increase coronary vascular resistance, and therefore can interfere with myocardial perfusion. All these factors must be considered in order to understand the mechanisms leading to myocardial ischemia, and therefore to the clinical syndrome of angina pectoris.

Further studies have shown the complex interaction of the coronary vessels and the peripherical vascular bed. The vessels of each group were treated as resistance vessels either in series or in parallel configuration. The results have demonstrated dramatically the individual and collective contribution of these vessels towards the maintenance if sufficient myocardial perfusion.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10209-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Evaluation of Disposable Blood Pressure Transducers

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

E.C. Walker, Mechanical Engineer, ACES, BEIB
T.L. Talbot, Mechanical Engineer, ACES, BEIB
R.E. Clark M.D. Chief, Heart Surgery, NHLBI
D.P. Dolan, CC, CCM

COOPERATING UNITS *(if any)*

NHLBI, Heart Surgery
CC, ICU
CC, Critical Care Medicine

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.25	.25	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A sample of each manufacturer of disposable blood pressure transducers was tested for compliance to AAMI's specifications for these devices. The data are currently being compiled for presentation to those responsible for placing these devices in use throughout the Clinical Center. The data do not represent an official endorsement of a particular device.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10210-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Electronic Patient Monitoring System

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
H.E. Cascio, Electronic Engineer, BEIB, DRS
G. Hemphill, Engineering Technician, BEIB, DRS
K. Musallam, Head Nurse, CCNURS
D. Cirelli, Administrator Officer, CC, OD

COOPERATING UNITS *(if any)*
CCOD

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.8	0.3	0.5

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

An electronic patient monitoring system that alerts the nursing staff when a patient (or patients) is leaving the nursing unit is a welcome aid in the care of Alzheimer's Disease patients and other patients with dementing illnesses. The system design is based on a wrist watch size radio transmitter, worn by the patient. A detector unit, placed at the two doors, senses the presence of any patient wearing a transmitter watch. With the detection of a patient's transmitter, a microprocessor based controller locks the exiting door, activates an alarm, and displays the patient's name and location on a computer monitor screen. The personal computer would record the time and date for each patient's attempt to leave. This data would then be used for statistical analysis.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10211-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
IEEE-488 GPIB and Personal Computer Instrumentation Use Program Development

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
T.R. Clem, Sr., Electronic Engineer, EEES, BEIB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.25	0.2	0.05

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The increased availability and reduced cost of the small Personal Computer has created increased interest in automating data acquisition and process or experiment control in areas where such things were not feasible before due to cost or complexity. With these changes also came a significant increase in the use of the IEEE-488 GPIB by instrument makers. By combining the two, sophisticated instrumentation and data acquisition systems can be assembled quickly and inexpensively. The BEIB is continuing to develop the expertise to provide guidance and assistance to requirements where this approach provides the optimum solution. This capability is further assisted by the BEIB-SERP specifying the IEEE-488 interface on new equipment acquisitions whenever possible. The increase at the NIH in the numbers and use of the IBM PC has made this capability of great value to the NIH Intramural Research program.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10212-02 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Fluoroimmunoassay Apparatus

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

W.S. Friauf	Chief, EEES	BEIB, DRS
R.L. Berger	Physicist	LTD, NHLBI
G. Hemphill	Electronic Tech.	BEIB, DRS

COOPERATING UNITS *(if any)*

CDC, Atlanta

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.2	0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

New rare earth chelate fluorescent probes with a decay time constant much longer than the background decay time-constant of typical organic materials offer the potential of a great improvement in sensitivity of time resolved fluorimetry. However, to rival radioimmunoassay methods the required sensitivity improvement is so great that overload recovery of the fluorescence detector is a major problem. Extensive past work on this problem is largely inapplicable to the very low speed and level requirements of this situation. Consequently initial effort is being applied to determining the optimum fluorescence detection device and ancillary signal overload limiting circuitry. Problems related to the fluorescent probe at extremely low sample concentrations will be studied in collaboration with CDC, which is interested in this approach as another tool for AIDS research. Finally an evaluation of the details of excitation, optical filtering, and digital signal processing will be worked out and optimized.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10213-02 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Vitreous Fluorophotometry Analysis

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

P.M. Bungay	Chemical Engineer	BEIB,	DRS
R.F. Bonner	Biophysicist	BEIB,	DRS
M.S. Roy	Ophthalmologist	CB,	NEI
M.J. Podgor	Statistician	BE,	NEI

COOPERATING UNITS *(if any)*

Clinical Branch, NEI; Office of Biometry & Epidemiology, NEI

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Chemical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.5	0.5	1.0

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Vitreous fluorophotometry (VFP) is a clinical procedure for measuring the spatial distribution of fluorescence along the optical axis in a human subject's vitreous following administration of a fluorescent dye. In this project the clinical instrument is a Fluorotron Master manufactured by Coherent, Palo Alto, CA, and the dye is sodium fluorescein given by intravenous injection. The purpose of the project is to improve the protocols for conducting the measurements, processing the output from the instrument and analyzing the results from the population of normal volunteers and patients.

One disease to be considered is diabetes and the associated pathology diabetic retinopathy. The goals are to evaluate the procedure for use in (1) screening for early detection, and (2) monitoring for treatment efficacy. A pharmacokinetic mathematical model has been developed which describes the rate of appearance of fluorescein in the vitreous in terms of the blood-retinal barrier permeability (characterized by permeability coefficients of the retina-vitreous interface) and transport of fluorescein within the vitreous by diffusion (characterized by a diffusion coefficient). Plasma protein binding of fluorescein is also incorporated. Measurements have been made on 22 normal volunteers to evaluate the performance of the instrument, establish baseline parameter ranges, and critique existing protocols/analysis schemes.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10214-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Photoradiation Therapy

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	P.D. Smith	Physicist	BEIB	DRS
Others:	R.F. Bonner	Biophysicist	BEIB	DRS
	A. Russo	Section Chief	ROB	NCI
	M. Manyak	Staff Fellow	ROB	NCI
	D. Mathews	Veterinarian	VRB	DRS
	H. Pass	Surgeon	SURG	NCI

COOPERATING UNITS *(if any)*
ROB, NCI; VRB, DRS; SURG,NCI

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, Md 20892

TOTAL MAN-YEARS: 2.5	PROFESSIONAL: 2.5	OTHER:

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Photodynamic therapy (PDT), which is the interaction of light with hematoporphrin derivative (HDP, Photofrin II), is being studied for possible clinical use in several areas. Currently, PDT is being investigated in the following: cancer of the prostate (beagles); carcinoma in situ of the bladder and urinary tract (foxhounds); and pulmonary metastatic disease (nude mice). Specially designed fiber optic probes and and introducers were manufactured for all cases, and calibrated in terms of irradiance delivered to the tissue. Photosensitised skin is a side effect of PDT, and the possibility of using agents to protect against this photosensitivity was addressed. In particular, hydrochlorothorazide appears to have a pronounced effect on reducing skin photosensitivity in nude mice models. Dosimetry for PDT is complex due to the variable irradiation levels within the tissue, sequestering of HDP, and tissue oxygenation. To address the first of these points and to permit light distribution within tissue to be formulated, measurements were made of light emanating from tissue as a function of radial distance from the point of injection of the light into the tissue. Theoretical analyses permit extraction of two parameters, the mean free path length between isotropic scattering events and the absorption coefficient, with and without the presence of HDP, for each of the tissues studied. These include muscle, bladder wall, liver, kidney, skin, etc. For these tissues, flux levels as a function of distance from the point of light injection have been established for three different wavelengths, 514nm, 660nm, and 780nm.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10215-02 BE1

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Measurement of Trace-Level Metals and Complexes in Biological Milieux

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
A.F. LeRoy, Ph.D., BEIB, DRS
M. Linnoila, M.D., Ph.D., CPB, NIMH
K. Flora, Ph.D., PRB, NCI
M.K. Wolpert, Ph.D., Drug Eval. Br., DCT, NCI
P. Galle, Prof. of Biophysics, Medical Faculty, Creteil, France
B. Hecquet, Ph.D.. Centre Oscar Lambret, Lille France
P. Parsons, Ph.D., BEIB, DRS

COOPERATING UNITS *(if any)*
CPB-NIMH, DCT-NCI, PRB-NCI, Biophysics Dept., Med. Faculty, Creteil, France: Centre Anti-cancereux "Oscar Lambret", Lille, France

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Analytical Methods

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.20	0.70	0.5

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Analytical methods have been developed for quantitation and characterization of metallic elements and their complex species present in biological samples at trace levels.

Analysis of vanadium in samples from human subjects under study has been conducted. Results obtained have shown very low concentrations, in the range of nanograms-of-vanadium-per-gram of sample. The very small amounts of CSF samples available make reliable, reproducible results difficult to assure.

Platinum complex behavior is under study for several different platinum-containing complex compounds used clinically. Chromatographic techniques are used to make separations of platinum complex species (bound and unbound to protein) in human plasma at clinically used concentration levels. Material balances suggest that all the platinum in the several fractions can be accounted for quantitatively. Analytical methods developed have been used to make kinetic studies of behavior of platinum species from cisplatin (including the parent complex, cis-diamminedichloroplatinum II (CDDP), and its transformation products) in plasma and to relate them to quantitation of protein in each fraction collected. Atomic Absorption Spectroscopy with electrothermal atomization is used to quantitate total platinum or single isolated species.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10216-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Enzyme Purification - Calmodulin

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
A.F. LeRoy Ph.D., BEIB/DRS
R. Berger, Ph.D., LTD, NHLBI

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Analytical Methods

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.1	0.1	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Validity of studies characterizing and measuring properties of calmodulin depend on having quantifiable measures of purity of the enzyme preparation and the proportion of calcium it contains and requires the availability of extremely pure reagents, buffer, and solvents and contamination free labware.

Analytical methods have been developed for quantitaiton of picogram quantities of calcium in highly purified preparations of calmodulin and in the reagents and solvents needed to make the preparations. Preliminary analyses show that the needed reagents and solvents for making ultra-pure enzyme preparations can be freed to satisfactory levels from such ubiquitous contaminants as calcium using techniques developed in our laboratory.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10218-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Analytical Electron Microscopy of Adrenal Chromaffin Cells

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.D. Leapman	Visiting Scientist	BEIB, DRS
Others:		
R.L. Ornberg	Biophysicist	LCBG, NIDDK
H. Pollard	Chief	LCBG, NIDDK

COOPERATING UNITS *(if any)*
Computer Systems Laboratory, Division of Computer Reserach and Technology, NIH (K.E.Gorlen)

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.7	0.7	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The elemental composition in various compartments of the bovine adrenal chromaffin cell was investigated by a combination of energy-dispersive x-ray spectroscopy and electron energy loss spectroscopy. Cryosections of quick-frozen cultured cells were transferred at low temperature (-170 C) into the Hitachi H700H analytical electron microscope and the samples were carefully dehydrated in situ. Spectra were recorded from: (1) secretory granules, (2) cytoplasm, (3) nuclei (4) mitochondria and (5) extracellular space. X-ray spectra were quantitated by means of specially prepared standards containing known amounts of protein and ions. Concentrations accurate to ± 5% or 10% could be established for most of the major elements. Electron energy loss spectra were analyzed with software developed in BEIB to determine ratios of nitrogen-to-phosphorus.

Experiments have been performed to investigate the effect of pH on catecholamine secretion and how this is correlated with changes in ionic distributions in the cell. Measurements have also been made on isolated secretory granules.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10219-02 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Quantitative Elemental Mapping of Rapidly-frozen Neural Tissue

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. D. Leapman	Visiting Scientist	BEIB
Others:		
S.B. Andrews	Special Expert	LN, NINCDS
T.S. Reese	Chief	LN, NINCDS
C.E. Fiori	Physical Scientist	BEIB, DRS
C.R. Swyt	Physical Scientist	BEIB, DRS

COOPERATING UNITS *(if any)*

Computer Systems Laboratory, Division of Computer Research and Technology, NIH (K. Gorlen)

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.5	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The elemental composition of the presynaptic and postsynaptic nerve terminals of rapidly-frozen synapses of the mouse cerebellar molecular layer was determined using electron probe x-ray microanalysis and elemental imaging by characteristic x-rays. Quantitative electron probe analysis of synaptic vesicle clusters and intraterminal mitochondria indicated that their calcium concentrations were 0.4 ± 0.1 and 1.2 ± 0.2 mmol/l respectively. Similar experiments were carried out on cerebellar slices rapidly frozen after incubation in vitro. The distribution of K and Ca in presynaptic terminals of resting and depolarized slices were qualitatively and quantitatively similar to those in fresh slices. Results suggest that the vesicles have a limited role in calcium storage and release. In contrast measurement of calcium in the postsynaptic region of the cerebellar molecular layer show evidence for calcium sequestration in a smooth membrane cistern of the derdritic process called the "spine".

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10221-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Elemental Imaging of Alveolar Macrophages

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
C.R. Swyt, Physical Scientist BEIB, DRS
C.E. Fiori, Physical Scientist, BEIB, DRS
R.D. Leapman, Visiting Scientist, BEIB, DRS
W. Rom, Senior Fellow, PB, NHLBI

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.5	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Refractile particles are observed by light microscopy (LM) in alveolar lavaged macrophages from patients exhibiting clinical symptoms of asbestosis, silicosis and coal-miner's emphysema. However the elemental composition and location of these particles in the ultrastructure of the macrophages cannot be determined by LM. Elemental x-ray images obtained in the CAMECA MBX microprobe from large fields of whole air-dried macrophages have enabled investigators to correlate particle composition with disease. High resolution images of individual macrophages in ultrathin sections of epon embeded preparations obtained in the Hitachi H700H analytical electron microscope utilizing bright field (BF), energy dispersive x-ray (EDS) and electron energy loss (EELS) signals have revealed both elemental composition and ultrastructural location of the particles.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10222-02 BEI

PERIOD COVERED
October 1, 1984 to September 30, 1985

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Elemental Distributions in Central Nervous System Tissues

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.R. Swyt	Physical Scientist	BEIB/DRS
R.M. Garruto	Senior Biologist	CNSS/NINCDS
C.E. Fiori	Physical Scientist	BEIB/DRS

COOPERATING UNITS *(if any)*
CNSS/NINCDS

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1	1	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
 ☐ (a1) Minors
 ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The occurrence of neurofibrillary tangles and plaques is common to a number of central nervous system disorders including Guamanian amyotrophic lateral sclerosis (ALS), parkinsonism with dementia (PD), and Alzheimer's disease. These NFTs and plaques contain nonessential metals and elevated levels of biological elements. Fixed and frozen thick sections of hippocampus and frontal cortex of human brain from subjects exhibiting symptoms of these diseases have been examined in the CAMECA MBX microprobe. Wave length dispersive x-ray spectrometry (WDS) performed at selected areas has provided both spectra and digital images showing the distribution of elements of interest in the specimens.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10225-02 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Processing of High Resolution Electron Micrographs

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Michael Unser	Visiting Fellow	BEIB	DRS
Benes Trus	Research Chemist	CSL	DCRT
Alasdair C. Steven	Visiting Scientist	LPB	NIADDK

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Office of the Chief

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	1.0	.0

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

High resolution micrographs are often of poor quality, due to various distortions and especially to a very low signal-to-noise ratio. Visual quality can be improved significantly by using correlation-averaging techniques to combine several observations of similar subjects.

We had previously developed methods for translational and rotational alignment of different views of ostensibly identical specimens. These techniques have been extended for the compensation of spatial deformations in slightly distorted periodic structures.

Multivariate statistical techniques have been implemented for the analysis and comparison of sets of images. Quantitative approaches have been developed for the automated removal of anomalous views and the assessment of spatial properties of the resulting averaged image (e.g., rotational symmetry and resolution).

These methods have been applied successfully to structure determination and quantitative assessment of Herpes Simplex type II Virus capsomers, T7 Virus, and skeletal muscle filament images.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10227-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
In Vivo Evaluation of Pulsed Intra-Arterial Infusions

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

D.R. Shook,	Biomedical Engineer	BEIB, DRS
S. Saris,	Staff Neurosurgeon	SNB, NINCDS

COOPERATING UNITS *(if any)*
Diagnostic Radiology, CC; Surgical Neurology, NINCDS;
Veterinary Resources Branch, DRS

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.05	0.05	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Diastolically phased pulsed intra-arterial infusions have been shown to be an effective means to produce concentration uniformity in downstream branches of a model of the cerebral circulation. The technique is being evaluated in the cerebral circulation of fully anesthetized Rhesus monkeys by the infusion of radio-isotope labelled iodoantipyrine into the internal carotid artery. The resulting tissue concentration is determined by quantification of autoradiographs.

Initial results show high uniformity of tissue concentration, indicating that the deleterious effects of infusate streaming can be alleviated.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10228-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Automated Medication Dispenser

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
C.P. Mudd, Biomedical Engineer, ACES, BEIB, DRS
H. Tipton, Engineering Technician, ACES, BEIB, DRS
Russell T. Wall, Anesthesiologist, CC, ANES

COOPERATING UNITS *(if any)*
ANES, CC

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
ACES

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.2	0.2	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The automated medication dispenser consists of a timing system to release medication at prescribed intervals of 2, 3, or 4 hours and an electronic security system to prevent unauthorized access to the medication. One or two pills can be dispensed per dose interval to provide up to 24 pills/day for 3 days without reloading. When the dispenser is loaded, a two digit patient identification number, 00 to 99, is set on two thumbwheel switches located in the pill compartment. After loading the medication, the dispenser can be locked. With the dispenser in operation, the medication is released into a holding cell at the prescribed intervals. When the medication reaches the holding cell, a opto-electronic detector senses its presence and stops the timing process. At this time, the patient must perform two acts to obtain the medication: (1) enter the two digit identification number into the dispenser via two pushbutton switches next to the release bar, and (2) press the release bar. If the patient entered identification number agrees with internal preset number, the release bar is activated and will release the medication if it is present in the holding cell. If the patient entered number is incorrect or there is no medication in the holding cell, the release bar remains disabled and will not function. Any attempt on the release bar resets the number entered by the patient to 00. All attempts on the release bar are recorded for use in adjusting the dose rate.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10229 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
All Tantalum Stopped Flow Differential Micro-Calorimeter

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.P. Mudd,	Biomedical Engineer	ACES, BEIB, DRS
R. Berger,	Chemist	LTD, NHLBI

COOPERATING UNITS *(if any)*
LTD, NHLBI

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
ACES

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD, 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.3	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Based upon the sensor design techniques recently used in batch micro-calorimeters, we have devised an all tantalum stopped flow calorimeter with significantly greater sensitivity and faster response times. The tantalum flow assembly consists of two inlet tubes and one outlet tube which are electron-beam welded to a tantalum mixer. An array of small, fast response thermopiles are located on opposite sides of the outlet tube. The outlet tube contains a volume of 350 micro-liters. A 0.1 mm stainless wire is also attached to the outlet tube for use in calibration. Two such assemblies are used in this differential instrument. The sensing portion of the tubing is mounted in a large heat sink and kept at the core or operating temperature of the calorimeter. As the tubes enter and leave the heat sink, they are routed together so that thermal artifacts propagating down the tubes will appear as common-mode and not differential signals. The resulting instrument has a sensitivity of 1 joule/volt*second and a 10 to 90% step response of 48 seconds.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10230-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Television Tracking of Beating Heart Cells in-vitro

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

W. Schuette,	Chief	ACES, BEIB, DRS, NIH
J. Parrillo,	Chief	CCMD, CC, NIH
C. Burch		CCMD, CC, NIH

COOPERATING UNITS *(if any)*
DRS, BEIB
CCMD, CC

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD, 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	0.6	0.4

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A Television Tracking System has been developed to measure the motion of beating Heart Cells in-vitro. The performance of these cells is used to monitor the presence of a circulating Myocardial Depressant Substance in Humans with septic shock. Beating myocardial cells were placed in a petri dish on the microscope stage at an inverted microscope and imaged by a television camera. Motion voltages were developed from the resultant television video by the tracking system.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10231-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Instrumentation Development for Fluorescence Spectroscopy

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

J.L. White,	Electronic Engineer	EEES, BEIB, DRS
J.R. Knutson,	Sr. Staff Fellow	LTD, NHLBI

COOPERATING UNITS *(if any)*

LTD, NHLBI

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.5	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Automatic control of a time-resolved fluorescence spectrophotometer was developed to enable the rapid collection of fluorescence spectra. Several peripherals of the laser based system are controlled by a Hewlett-Packard Series 1000 mini-computer, including the acquisition, transfer, and storage of data, the selection of samples, and the automatic positioning of monochromators for wavelength selection. The control of these peripherals allows data to be collected more quickly than is possible with a manual system, with little or no operator intervention, and also allows maximum flexibility in the design and enhancement of experiments.

Specific experiments that incorporate computer control and acquisition include alternating between sample and reference lamp data acquisition at fixed wavelengths to achieve fluorescence decay curves, and collecting time-resolved fluorescence data from a sample while rapidly scanning through a series of wavelengths. Because modular programming was used, new experiments can be easily configured.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10232-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Hardware Expansion for Flow Cytometer

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson,	Electronics Engineer,	EEES, BEIB, DRS
J.A. Dvorak, Dr.		LPD, NIAID

COOPERATING UNITS *(if any)*
LPD, NIAID
ACES, BEIB, DRS
EUII, BEIB, DRS

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronics Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	0.3	0.7

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The Flow-Cytometer in LPD has had extensive modifications made to it in two distinct areas. This lab has been responsible for the enhancement of the computer system and the system electronics. The computer was upgraded from a DEC PDP-8 to a DEC PDP11/40 and then to a DEC PDP11/34 with a 67Mb disk system and a 1600 Bpi tape drive. Along with the hardware changes, numerous software changes are planned to ease the operation of the Flow-Cytometer in the future.

The forward angle scatter detector has been replaced along with the Laser and most of the Flouresence optics (ACES). Also a Coulter Volume circuit has been added and many changes have been made to the interface electronics to increase the sensitivity of the instrument.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10233-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Computer System for Analysis of Monkey Vocalizations

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson,	Electronics Engineer,	EEES, BEIB, DRS
Dr. D. Symmes,		LCE, NICHD

COOPERATING UNITS *(if any)*

LCE, NICHHD
EUII, BEIB, DRS

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.2	0.3

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A computer system has been assembled to analyze monkey vocalizations and display the results in the traditional format of waterfall displays.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10234-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Computer Aided Tracking of Myosin Coated Beads on Actin Filaments

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson,	Electronics Engineer	EEES, BEIB, DRS
D.Sellers,		LMC, IR, NHLBI

COOPERATING UNITS *(if any)*

LMC, IR, NHLBI
EUII, BEIB, DRS

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronics Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.2	0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A system using a microcomputer with a graphics board, mouse, timer, and video board is being put together with a color TV camera and a VCR to track Myosin coated beads over time as they interact with Actin. The programming is being done in complied BASIC and Pascal to collect and display the data.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 10235-01 BE1

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Filtration of Cholesterol in vivo from Human Subjects

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Pnncipal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson,	Electronics Engineer,	EEES, BEIB, DRS
Dr. H. Klein		BB, CC

COOPERATING UNITS *(if any)*

BB, CC
EUII, BEIB, DRS

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.2	0.3

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Some human subjects have extremely high levels of cholesterol and an experimental protocol has been devised to filter out large amounts of cholesterol using a commercial cell separator followed by filtration of the plasma and re-injection of the plasma into the subject.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10236-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Instrumentation for Various Electron Microscopes

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson	Electronics Engineer	EEES, BEIB, DRS
C.E. Fiori	Physicist	OC, BEIB, DRS

COOPERATING UNITS *(if any)*
EUII, BEIB, DRS
CSL, DCRT

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronic Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.1	0.2

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Planning is underway to control the Cameca Microprobe with an IBM PC-XT equipped with a number of add in peripheral cards to control the wavelength spectrometers, collect the various analog and digital signals, control the stage movement, transfer the collected data to the PDP11/60 for display and analysis, and provide miscellaneous functions such as nitrogen filling, beam blanking, and contrast control.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10237-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Text to Digital Character Conversion

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

J.R. Ellis	Expert	OC, BEIB, DRS
H. Marshall		OC, OD
M. Brandenberg		OC, OD
J. Gruber		EU1, SES, BEIB, DRS

COOPERATING UNITS *(if any)*
OC, OD

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Office of the Chief

INSTITUTE AND LOCATION
DRS, National Institutes of Health

TOTAL MAN-YEARS: .15	PROFESSIONAL: .10	OTHER: .05

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The NIH Office of Communications desired to form a computer readable list of NIH alumni, current and former affiliations, and addresses for the the NIH Centennial celebration. In general, the digital tape records of personnel and affiliations are no longer available. Many relevant printed and typed documents, such as the series of NIH Scientific Directories, are available. This organization wished to read such records and use the results for mailing lists, and other record keeping for this reunion.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10238-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Automation of BEIB Information Processing Functions

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
J.R. Ellis, Expert, OC, BEIB, DRS
A.G. Stringer, Administrative Officer, OC, BEIB, DRS
H.S. Eden, Deputy Chief, OC, BEIB, DRS
C.Martin, Management Analyst MAO, DRS

COOPERATING UNITS *(if any)*
MAO, DRS
CSL, DCRT

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Office of the Chief

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.5	2.0	0.5

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The computational and accounting resources of the branch are often inadequate to the demands placed on them. The objective of this project is three-fold. The first is to determine the needs of the branch. Second, we need to identify and obtain appropriate resources from the modern world of computer science and data processing. Third, there is a requirement to match resources in a fast-moving scenario and changing user demands that cannot be specified in advance.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10240-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Clinical Measurement of Microvascular Blood in Sickle Cell Patients

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
E.C. Walker, Mechanical Engineer, A.C.E., BEIB
G.P. Rodgers, Clinical Associate, LCB, NIDDK

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: 1.5	PROFESSIONAL: 1.5	OTHER:

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☒ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Current viewpoints assume that manifestations of sickle cell disease result from the obstruction of capillary networks by abnormal erythrocytes during deoxygenation. Using a commercially available Laser Doppler Velocimeter (Med Pacific LD 5000) we propose to monitor non-invasively cutaneous blood flow in stable sickle cell patients under various conditions of steady state and perturbed flow. Additionally, since red cell deformability is a key factor in determining capillary flow we will monitor in vitro filtration rates of cells under various conditions.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10241-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Cisplatin Kinetics

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

P.J. Parsons Visiting Fellow, BEIB, DRS
P.F. Morrison, Physical Scientist, BEIB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Chemical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.3	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Experimental and theoretical studies on the chemistry of cisplatin (DDP) have been initiated with the goal of characterizing the reaction kinetics of the drug in vitro. This knowledge should lead to an identification of the principal reactive species and pathways, with attendant implications for the design of drug protocols.

Refinement of the separation and detection techniques required for the investigation has been undertaken. An improved high-performance liquid chromatography and hanging mercury drop electrode technique has been used to follow the fate of DDP and its major hydrolysis products in various aqueous media. Peaks corresponding to the two metabolites have been identified by using off-line fraction collection with platinum determination by atomic absorption methods; kinetic analysis of these platinum-containing peaks has confirmed their identities. The results of kinetic studies are in remarkably good agreement with results of other researchers, but they leave many unanswered questions pertaining to the nature of the reaction mechanism.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10242-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Automated Method for the Detection of Animal Circling

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

A. Markowitz, Electronic Engineer, ACES, BEIB, DRS
W. Schuette, Chief,ACES, BEIB, DRS
B. Chidakel, Electronic Tech, BEIB, DRS
K. Bankiewicz, Physician, NINCDS
T. Tedder, Mechanical Tech, BEIB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: 1.5	PROFESSIONAL: 1.0	OTHER: 0.5

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Parkinson's disease is chemically induced by infusion of MPTP into the right internal carotid artery of an animal. The infusion produces injury to one side of the brain, causing Parkinson symptoms and spontaneous motor activity of circling toward the injured side. Treatment with drugs (apomorphine or L-DOPA/ carbidopa) or brain implants causes circling towards the intact side.

An automated method to measure this circling as a function has been developed. The rotation of the animal is plotted as a bar graph as function of time. The previous method of monitoring animals by means of television was both time consuming and expensive, especially with multiple animal experiments.

The system consists of back-pack-mounted infra-red (IR) emitting transmitters, cage mounted IR sensors, specialized electronics and a microcomputer system capable of monitoring many animals simultaneously.

Each IR transmitter consists of an oscillator pulsing four IR light emitting diodes (LED), mounted on a 9 volt transistor radio battery and inserted in a jacket worn by the animal. A radiation pattern of 180 degrees is achieved by the transmitter. An IR phototransistor is the receiver, and it is mounted in the center of each cage wall. The output of each detector is amplified by a high pass amplifier, full wave rectified, processed by a slow time constant low pass filter and then presented to a 32 channel A/D converter located in a Zenith Z-100 PC computer system.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10243-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Using Acyclovir to Prevent UVB Light Reactivation of Herpes Simplex

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. Corsey Electronic Engineer BEIB, DRS
S. Straus Section Chief NIAID
J. Rooney Research Associate NIDR
A. Notkins Research Associate NIDR

COOPERATING UNITS *(if any)*

Nursing Department, Clinical Center

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.0	1.5	0.5

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Ultraviolet light (UVB) has been demonstrated to induce reactivation of Herpes Simplex Virus in non-genital areas in which prior recurrences had been observed. The purpose of this study is to evaluate the ability of acyclovir to suppress the induction of recurrent Herpes Simplex Virus infection by UVB light. Patients will be randomized on a cycle of radiation to receive oral acyclovir or placebo pills for six days in a double-blind study. Each cycle will consist of four challenge irradiations with four miminal erythematous doses of UVB light each. Each patient will be followed for documentation of recurrent lesions induced by UVB light or spontaneously occuring lesions throughout the course of the study. Acyclovir has been shown to have significant effects on pain, lesion crusting, lesion healing and viral sheading when administered intravenously. It has also been shown to have significant efficacy in relief of pain, itching and viral sheading time when topically administered. Oral as opposed to intravenous or topical acyclovir will be used exclusively in this study. An area of skin which is near but not overlapping sites previously involved with herpetic recurrence will be selected. A template will be utilized to isolate four 1 cm in diameter areas of skin. A special apparatus which can hold four fluorescent tubes at a distance of 25.4 cm from the target site will be utilized. The fluorescent tubes will have output primarily of UVB (290-320 nm) with a reduced output of UVA (320-400 nm) average caucasian skin pigmentation would call for about four minutes exposure with increased melanin requiring more exposure time.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10244-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Exogenous Insulin to Treat Anorectic Weight Losing Cancer Patients

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. Corsey	Electronic Engineer, BEIB, DRS
J. Norton	Section Chief, NCI
K. Kern	Research Associate NCI

COOPERATING UNITS *(if any)*

Nutrition Department Clinical Center, NIH
Nursing Department Clinical Center, NIH

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.0	1.5	0.5

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☒ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Weight loss is a common problem in patients with cancer, affecting their quality of life and their ability to respond to therapy. Total parenteral nutrition has not been able to reverse the body depletion phenomenon to the point where oncologist question the efficacy of its use in the cancer patient. On the other hand, insulin has been shown to improve food intake, nitrogen balance and body weight in wasting-state rats without stimulating tumor growth. Insulin treatment has also been shown to increase body cell mass, the fundamental structural component of animals. In rat studies, this improvement has led to improved survival following tumor resection. This study will evaluate 20 patients who have lost at least 10% of normal body weight, have biopsy proven cancer and are in an anorectic state. The patients also must have a functioning gastro-intestinal tract. The following questions will be investigated.

1. Can low-dose exogenous insulin improve body weight, cell mass, food intake, nitrogen balance and body catabolism of an anorectic patient with cancer?
2. Can exogenous insulin accomplish the above without developing dangerously low blood sugar levels?

A whole body counter will be used to measure the K40 level of each patient. This measurement relates directly to the body cell mass. Resting energy expenditure will be determined and the metabolic kitchen will be utilized for a balance study.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10245-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Positions Emission Tomography in the Study of Extremity Soft Tissue Sarcomas.

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. Corsey	Electronic Engineer	BEIB, DRS
J. Norton	Section Chief	NCI
A. Chang	Research Associate	NCI

COOPERATING UNITS *(if any)*
Nutrition Department, Clinical Center, NIH
Department of Nuclear Medicine, Clinical Center, NIH
Laboratory of Pathology, National Cancer Institute, NCI

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.0	1.5	0.5

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☒ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Positron Emission Tomography (PET) can be used to measure glucose utilization in human tumors. Since rapidly growing poorly differentiated neoplasms have higher rates of glycolysis than slow growing well differentiated neoplasms, PET scanning may be used to categorize the degree of malignancy. It has already been used to predict survival time in glioma patients and it has been used to image glucose utilization in extremity soft-tissue sarcomas. Since no study has correlated glucose utilization rate in extremity sarcomas with histologic grade or clinical outcome, the present study will attempt to answer the following questions:

1. Can PET scan results be used to estimate glucose utilization rates reproducibly?
2. Do PET scan results of glucose utilization rates correlate with histopathology as read in the Department of Pathology?
3. What is the glucose 6-phosphatase level of fresh human tumor after resection of extremity sarcomas?
4. What is the fresh glucose 6-phosphatase activity of human muscle from extremity sarcoma specimens?

Patients will be studied for resting energy expenditure by the method of indirect calorimetry. This will help gather information about any distant metabolic effects produced by soft-tissue sarcomas resulting in abnormal glucose metabolism.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10246-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Acousto-Optically Controlled Light Source for Microscopy

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	P.D. Smith	Physicist	BEIB, DRS
Others	K.G. Spring		LKE, NHLBI

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electronic and Electrical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Md. 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.25	.25	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

An optical system, featuring an acousto-optic element, was designed as an illumination source for a microscope. This arrangement provides significant advantages over conventional light sources. First, the wavelength of illumination can be readily changed; second, the intensity of the illumination can be adjusted to a constant level; third, both the wavelength and intensity changes can be accomplished at rates up to several MHz by signals originating in computer software.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10247-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

The Effect of Mitral Valve Replacement On Left Ventricular Geometry

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Thomas L. Talbot,	M.S.	ACES	BEIB	DRS
Robert J. March,	M.D.	SB	NHLBI	
Richard E. Clark,	M.D.	SB	NHLBI	

COOPERATING UNITS *(if any)*

Surgery Branch, NHLBI

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Applied Clinical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
3.0	2.0	1.0

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

  ☐ (a1) Minors

  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The correction of chronic mitral insufficiency by conventional mitral valve replacement carries a higher postoperative morbidity and mortality than operation for most other valvular lesions. Clinical studies have shown that valvuloplasty performed to correct mitral insufficiency is associated with a lower morbidity and mortality than with valve replacement. It is suggested that the maintenance of the mitral apparatus (chordae tendinae) prevents enlargement of end-diastolic and end-systolic dimensions. By utilizing each ventricle as its own control, the effect of chordal severence after valve replacement on regional and global geometry was examined. Two groups of animals (chronic and acute) were compared.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10248-01 BEI

PERIOD COVERED

October 1, 1985 - September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Intra-arterial Optical Evaluation

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	P.D. Smith	Physicist	BEIB	DRS
Others	R.F. Bonner	Biophysicist	BEIB	DRS
	R. Balaban	Physical Scientist	LKE	NHLBI
	M.B. Leon	Cardiologist	CB	NHLBI
	D. Lu	Clinical Assoc.	CB	NHLBI
	R.L. Bowman	Chief	LTD	NHLBI

COOPERATING UNITS *(if any)*

NHLBI

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	1.0	

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Evaluation of the intra-arterial wall surface is necessary for control of surgical procedures envisioned using laser ablation of tissue. Angioscopy inside vessels produces clear observation of the target sites provided adequate irrigation of saline solution is maintained. Precise quantitative location of the target is difficult. In addition, size constraints may limit angioscopy's usefulness in the coronary vessels.

Preliminary fluorescent observation of human atheromatic and normal aorta specimens was performed using a fluorescence microscope with 450-490nm excitation. Fluorescence spectra collected using a multi-channel analyzer indicated clear intensity differences between the normal and atheromatic tissue. These differences were reduced and eliminated by ablation of the atheroma by either an argon laser (514nm) or a xenon chloride (308) excimer laser.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10249-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Kinetics of Folate Metabolism

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

P.F. Morrison,	Physical Scientist	BEIB, DRS
C.J. Allegra,	Physician	CP, NCI

COOPERATING UNITS *(if any)*
Clinical Pharmacology Branch, NCI

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Chemical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.5	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Over the last decade, research has shown that the antifolate effects of the drug, methotrexate (MTX), are mediated by its polyglutamate metabolites. The polyglutamates are known to be responsible, directly or indirectly, for inhibition of both thymidylate and purine synthesis. Ultimately we are interested in formulating a biochemical kinetic model useful for exploring various hypotheses of purine inhibition by MTX, but before this is possible, the kinetics of MTX cellular transport and of its polyglutamation must be described.

Accordingly, the polyglutamation kinetics of methotrexate (MTX) in MCF-7 human breast cancer cells have been formulated mathematically. The model accounts for glutamation and hydrolysis kinetics up through the pentaglutamate level, increased synthesis of dihydrofolate reductase following exposure to drug, reversible tight-binding to reductase, and membrane transport of all the drug polyglutamates. The glutamation, hydrolysis, and efflux parameters have been determined from fits to experimental MTX polyglutamate uptake and efflux data. The preferred substrate for folypolyglutamyl synthase in the intact cell has been shown to be MTX diglutamate, on average being 2 to 3 times as reactive as either the parent drug or the triglutamate. Hydrolysis rate constants exhibit no clear trend with chain-length because of the large uncertainty of each parameter estimate. However, the efflux of MTX polyglutamates from MCF-7 cells does show a trend with chain-length, decreasing with increasing length as expected. The model also shows quantitative agreement with the fraction of MTX polyglutamates found still to be bound to reductase in MCF-7 cells following 24 hrs of efflux.

BIOMEDICAL ENGINEERING AND INSTRUMENTATION BRANCH

DIVISION OF RESEARCH SERVICES

NATIONAL INSTITUTES OF HEALTH

ANNUAL REPORT FY 1986

Dr. Murray Eden, Chief

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DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10001-18 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Pharmacokinetics

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.L. Dedrick	Chief, CHES	BEIB, DRS
Others:		
F. Farris	North Dakota State University	
R. J. Lutz	Chemical Engineer	BEIB, DRS
F. King	North Carolina A&T Univ.	
P. F. Morrison	Physical Scientist	BEIB, DRS

COOPERATING UNITS *(if any)*
CPB, NCI (J.M. Collins); DR-CC (J.L. Doppman); NTP-NIEHS (H.B. Matthews); SNB-NINCDS (E.H. Oldfield); University of Maryland (M.Egorin).

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Chemical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.5	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Pharmacokinetic models are developed for the distribution and disposition of drugs, environmental contaminants, and endogenous metabolites in animals and man. They provide a plausible set of equations that can be used to extrapolate data from animals to man and thereby improve chemotherapy and risk assessment. Emphasis has been placed on regional drug administration, and this has led to the development of spatially distributed models of drug transport in tissue. These analyses have provided considerable insight into the penetration depths of drugs administered intraperitoneally or by infusion into the brain. Pharmacokinetic theory which was developed for intra-arterial drug administration combined with extracorporeal treatment of venous drainage has been further validated in the clinic. Preliminary results have shown the feasibility of documenting appropriate vascular drainage with indocyanine green. Interspecies scaling of regional drug administration has been explored, and a clear allometric basis has been elaborated.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10002-21 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Implant Device Development

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
John W. Boretos, Physical Scientist, BEIB, DRS

John Doppman, M.D.	Radiologist	CR, CC, NIH
Edward Oldfield, M.D.	Neurosurgeon	NINCDS, NIH
F.T. Hambrecht, M.D.	Health Science Adm.	NINCDS, NIH
Richard Clark, M.D.	Heart Surgeon	NHLBI, NIH
Donald Wright, M.D.	Neurosurgeon	NINCDS, NIH

COOPERATING UNITS *(if any)*
CR, CC, NIH; NS, NINCDS, NIH;
FNP, NINCDS, NIH; S, NHLBI, NIH;
BEIB, DRS, NIH.

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Chemical Engineering

INSTITUTE AND LOCATION
DRS, NIH Bethesda, MD. 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	0.7	0.3

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of this project is to elucidate the interaction of biomaterials used for specific implants with the physiological environment and to explore specially prepared biomaterials and design features with respect to their suitability and performance in a variety of contexts. Polymers, metals and ceramics are important for use in catheters, heart assist pumps, artery cuffs, electrode insulation and similar implant applications. Variations in these materials as well as physically induced stress and environmentally accelerated degradation can severely reduce their effectiveness for long-term use as a surgical device. Previous studies undertaken by this project have shown a relationship between the molecular chain structure and resistance to hydrolysis. Recent evidence suggests that physical forces such as stress induced during fabrication can promote a form of stress corrosion. In vitro test data and SEM photomicrographs of surgical explants of various polyurethane classes show that premature failure is often the result of a combination of forces acting on the polymer at stress risers. Polymer systems and composites capable of timed dissolution offer significant advantages in the development of devices that allow natural tissues to take over as healing progresses. Tissue ingrowth into porous materials provides greater stability for specific implants. A strong correlation exists between these in vitro and in vivo observations over short and long term periods of study.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10015-11 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Development of Everting (Toposcopic) Catheter for Clinical Vascular Use

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI: D.R. Shook, Biomedical Engineer,	BEIB, DRS
J.L. Doppman, Chief,	DRD, CC
E.H. Oldfield, Chief (Acting)	SNB, NINCDS
D.L. Miller, Radiologist	DRS, CC
H.R. Keisar, Clinical Director	DIR, NHLBI

COOPERATING UNITS *(if any)*
Diagnostic Radiology, CC (J.L. Doppman, D. Miller);
Surgical Neurology, NINCDS (E.H. Oldfield)

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section,

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.1	0.1	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The everting catheter has been shown to be a reliable clinical means to catheterize long, small diameter, and highly tortuous blood vessels, inaccessible by previous techniques. An everting element evaginates from the tip of a conventional catheter. This extremely flexible polyurethane element has been fabricated in 3, 4 and 5 French sizes mated with 5, 6 and 7 French catheters, respectively, and is capable of eversion lengths in excess of 40 cm.

The catheter has been applied clinically for the local delivery of chemotherapy to brain tumors and of embolizing agents in the liver. In the former, treatment is provided by positioning the conventional catheter in the internal carotid artery from a femoral entry; everting the element through the carotid sinus, beyond the ophthalmic artery to avert retinal toxicity; and perfusing the tumor through the middle and/or anterior cerebral arteries. Note that a conventional catheter cannot safely negotiate the tortuosity of the carotid sinus. In the latter application, embolizing agents are delivered intra-arterially to block the perfusion of hepatic tumors. The sinuousity of the vessel precludes access by conventional techniques.

The catheter has been extensively used clinically in its present prototype form, and production techniques for its fabrication have been transferred to private industry to provide for a ready source of catheters for future studies.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10034-09 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Three-Dimensional Histological Reconstruction

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

S.B. Leighton, Mechanical Engineer, BEIB, DRS
A.M. Kuzirian, Neuroanatomist, LB, NINCDS

COOPERATING UNITS *(if any)*

LB NINCDS

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.2	.2	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A semi-automatic system for acquiring three-dimensional structural information about histological material is being developed. The system should have significant speed and reliability advantages over present techniques using serial sections, although resolution may be limited. In brief, an embedded tissue block will be fixed relative to a scanning electron microscope imaging system, the surface of the block will be imaged and the image stored, and successive slices will be removed by a built-in microtome. Handling and registration of thin sections will thus be eliminated. Human and computer pattern recognition will transform the resulting set of images into a three-dimensional reconstruction. Oxygen plasma etching has been found to give sufficient topographic relief that the resolution of the images is now limited by the SEM and not by the preparation technique. The images of Hermissenda Crassicornis obtained by this technique correlate well with TEM images of the same tissue, indicating that the lack of artifact is adequate for the contemplated studies.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10039-09 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Biophysical Instrumentation and Methodology

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Marc S. Lewis, Research Chemist, BEIB/DRS

Other: Thomas R. Clem, Electronics Engineer BEIB/DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Analytical Methods

INSTITUTE AND LOCATION
DRS, National Institutes of Health, MD 20892

TOTAL MAN-YEARS: 0.1	PROFESSIONAL: 0.1	OTHER:

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The project is designed to develop new instrumentation and methodology or improve existing instrumentation and methodology for characterization of biological macromolecules and for studying their interactions. Analytical ultracentrifugation, the techniques ancillary to it, and methods of data analysis using mathematical modeling appropriate for these techniques are the major areas of interest.

The major emphasis in this project has been given to the development of new applications of the techniques of mathematical modeling to problems in ultracentrifugal analysis. The two areas this project has been concerned with have been an extension of the method of implicit constraints to a wider range of studies of macromolecular interactions and a new approach toward obtaining molecular weight distributions in solutions of macromolecular biopolymers. MLAB, operating on the DEC-10 computer, has been used for the mathematical modeling. The applications of these studies are described in the annual report entitled Physical Chemistry of Biological Macromolecules.

No new work on data acquisition has been carried out except for the continuation of a study on the possibility of development of new optical data acquisition systems for the conversion of current preparative ultracentrifuges into analytical ultracentrifuges with superior capabilities as analytical instruments at a fraction of the cost of the current instruments. New preliminary designs for such systems have been developed.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10043-09 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Fiber Optic Probes

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

John I. Peterson, Chemist, BEIB/DRS
Einar Stefansson, EICB

COOPERATING UNITS *(if any)*

RVR

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Chemical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS: .8	PROFESSIONAL: .8	OTHER:

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A suitable device is needed for the direct measurement of oxygen partial pressure (PO_2) in blood and tissue for both clinical and research applications. Methods currently available for measuring P02 lack convenience, reliability, speed, and relevance to many situations of interest. Efforts to develop electrical sensors have not been successful. It is desirable to have a very small P02 sensor which can be inserted into a blood vessel or tissue with little disturbance, and which will provide instantaneous and current P02 monitoring for either short or extended periods of time. A fiber optic sensor is ideal for this application, with the advantage, for physiological use, of very small size and flexibility, safety, and low cost. A P02 sensor has been developed, based upon the principle of fluorescence quenching by oxygen. The feasibility of the sensor and its satisfactory performance has been demonstrated in in vitro and in vivo tests, in work in preceding years. In the previous year, the development of the sensor as a needle probe was accomplished, and problems of storage life and stability were resolved.

During the past year, several problems relating to development of a usable instrument and probe were solved, and the system was used for experiments to measure P02 in the eyes of dogs. This was done in comparison with polarographic electrode measurements of P02. The experiments were done to evaluate the suitability of the sensor for studies of diabetic retinopathy.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10096-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Light Scattering Method for Evaluation of Platelets

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. F. Bonner Physicist BEIB DRS

T.R. Clem	Elect. Engineer	BEIB DRS
S.B. Leighton	Mech. Engineer	BEIB DRS
J. Fratatoni	Dir. Blood Bank Products Branch	DBBP,CDB, FDA
B. Poindexter	Biologist	BBPB, DBBP, CDB, FDA
P. Mintz	Director	Blood Bank, U. Virginia

COOPERATING UNITS *(if any)*
Center for Drugs and Biologics, FDA
Blood Bank, U. Virginia

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronic Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.4	0.4	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

In the preceeding years of this project we have developed a unique instrument to noninvasively assess the concentration and morphology of transfusion platelets in a rapid clinically acceptable procedure. The basis of this measurement is low-angle multiple scattering of light and the changes in this signal associated with orientation of the subset of the platelet population that are discoid. The instrument, as developed, is automated under microprocessor control and calculates the clinically important values of concentration and percentage that are discoid of the platelets in transfusion bag within a 3-minute period. These highly accurate measurements are being used in a variety of research studies of the effects of various storage conditions (e.g., temperature transients, bag wall material, addition of pharmacological agents) on the condition of stored platelet concentrates.

The instrument was originally designed to play a significant role in improving the quality of platelet transfusions, by routine and accurate noninvasive assessment of platelet transfusions, by routine and accurate noninvasive assessment of platelet quality (as represented by the degree or normal platelet morphology). To this purpose ongoing studies at the Univ. of Va. Medical School Blood Bank are directed at its clinical utility and determining the degree of correlation of the noninvasive measurement with clinical efficacy of the platelet transfusion.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS-10097-06 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Studies in Cardiovascular Dynamics

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.S. Chadwick,	Biomedical Engineer,	BEIB, DRS
J.C. Ohayon,	Visiting Fellow,	BEIB, DRS
C. Oddou,	Professor,	University of Paris
P. Brun,	Senior Researcher,	INSERM U. 138
B. Levy	Senior Researcher,	INSERM U. 141

COOPERATING UNITS *(if any)*

INSERM U.138 U.141
University of Paris XII, Laboratory of Physical Mechanics

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.5	1.5	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Our existing model for myocardial and ventricular mechanics will be refined to include an isotropic component of elasticity, passive and active viscoelasticity, non-cylindrical geometry, pathological fiber organization, myocardial blood flow, myocardial oxygen demand, and effects of activation pattern. The model will used in conjunction with ultrasonic kinematic data to determine performance parameters. The physiological relationships between phasic coronary arterial and venous pressure and blood flow, aortic input impedance and ventricular dimensions will be determined. A mathematical and physical model of myocardial blood flow will be developed incorporating vessel collapse. Experimental techniques will be developed to measure vascular distensibility in man. RF backscatter from the myocardium will be investigated both experimentally and mathematically with the idea of determining the stress field. Theoretical models of wave propagation in arteries and aortic input impedance will be checked against experimental data.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10098-06 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Laser Instrumentation for Vitreous & Cardiovascular Microsurgery

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.F. Bonner	Physicist	BEIB DRS
P.D. Smith	Physicist	BEIB, DRS
M. Leon	Sr. Investigator	CB, NHLBI
S. Epstein	Chief	CB, NHLBI
D. Lu	Fellow	CB, NHLBI
R. Clark	Chief	SB, NHLBI
C. Kupfer	Director	NEI

COOPERATING UNITS *(if any)*

Clinical Branch, NEI; Optical Science Branch, Naval Research Lab;
Cardiology Branch & Surgery Branch, NHLBI;

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electrical and Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.5	2.5	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

This program covers the long standing development of laser microsurgical techniques which initially centered on ophthalmological applications and new systems of interest in that field (Pulsed Carbon Dioxide lasers and pulsed ND:YAG slit lamp-based laser systems). Its primary focus for the last 3 years has been in cardiological application of lasers, in particular laser angioplasty. In order to develop new laser microsurigal techniques in this new field, it was necessary to analyse a variety of laser sources and their tissue effects and the feasibility of transmission through flexible fiber optics. New sources such as Erbium:YAG (YLF) lasers coupled to zirconium fluoride optical fibers and excimer lasers coupled to fused silica fibers were examined as well as more conventional sources (pulsed carbon dioxide and Nd:YAG lasers, and continuous wave argon and dye lasers).

In collaboration with the Naval Research Lab, we have developed the new eribium laser microsurgery technology through feasability studies to the development of hte initial microsurigal prototype using zirconium fluoride fibers. Refinement of this system is primarily directed towards intravascular ablation (laser angioplasty) but include application to intraocular surgery (particularly vitreal and corneal transplantation), destruction of renal stones, and endoscopic microsurgery.

Parallel development of excimer microsurgery has evaluated state-of-the-art technology and provided a research microsurgical system for in vivo studies.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10099-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Cochlear Mechanics and Hair Cell Transduction

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.S Chadwick,	Biomedical Engineer	BEIB,	DRS
J. Rinzel,	Chief	MRB,	NIADDK
S. Shamma,	Assistant Prof.	Univ. of MD,	Dept. of Electrical Engineering
K. Morrish	Staff Fellow	MRB,	NIADDK

COOPERATING UNITS *(if any)*

NIADDK, Mathematical Research Branch
Univ. of Maryland, Dept. of Electrical Engineering

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.25	0.25	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A mathematical model of cochlear processing is developed to account for the nonlinear dependence of frequency selectivity on intensity in inner hair cell and auditory nerve fiber responses. The model describes the transformation from acoustic stimulus to intracellular hair cell potentials in the cochlea. It incorporates a linear formulation of basilar membrane mechanics and subtectorial fluid-cilia displacement coupling, and a simplified description of the inner hair cell nonlinear transduction process. The analysis at this stage is restricted to relatively low frequency single tones. The computed responses to single tone inputs exhibit the experimentally observed nonlinear effects of increasing intensity such as the increase in the bandwidth of frequency selectivity and the downward shift of the best frequency. In the model the first effect is primarily due to the saturating effect of the hair cell nonlinearity. The second results from the combined effects of both the nonlinearity and the inner hair cell lowpass transfer function. In contrast to these shifts along the frequency axis, the model does not exhibit intensity dependent shifts of the spatial location along the cochlea of the peak response for a given single tone. The observed shifts therefore do not contradict an intensity invariant tonotopic code.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10103-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Triple Laser-Multi Parameter Flow Cytometry System for Study of Tumor Cell Kinetics

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

W. Schuette	Chief, ACES	BEIB, DRS
S. Shackney	Allegheny Gen. Hosp.	Pittsburgh, PA 15212
J. Dvorak	LPD-NIAID	
F. Plowman	ACES	BEID, DRS

COOPERATING UNITS *(if any)*
DRS-NCI
LPD-NIAID

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
3.0	2.0	1.0

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A Triple laser flow cytometer has been developed so that various immuno-fluorescent labeling techniques may be employed for the investigation of cell kinetics. Three laser beams at different wave lengths are made to intersect a tumor cell flow stream passing through a quartz cuvette so that multi-parameter signals may be obtained. These signals are processed by specialized electronics and then analyzed by means of a PDP 11 computer. Simplified optics have increased light detection efficiency by an order of magnitude. The system is currently being used for the investigation of a unicellular protozoon known as trypanosoma cruzi, the causative agent of Chagas disease. Electronic cell volume capability has been added to the system to assist in the bivariate analysis of trypanosoma cruzi fluorescence data.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10109-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Adjunctive Heat Treatment of Cancer

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.L. Levin, Biomedical Engineer, BEIB, DRS
M. Hagmann, Senior Staff Fellow, BEIB, DRS
J-L Guerquin-Kern, Fogarty Fellow, BEIB, DRS
C. Charny, Guest Worker, BEIB, DRS
H. Coldefy, Fogarty Fellow, BEIB, DRS
A. Zabel, Physician, ROB, NCI
E.J. Glatstein, Chief, ROB, NCI

COOPERATING UNITS *(if any)*

Radiation Oncology Branch, NCI

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section,

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: 4.2	PROFESSIONAL: 4.2	OTHER:

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of this project is to facilitate the development of adjunct hyperthermia modalities for cancer treatment by theoretically and experimentally studying the spatial and temporal variation in the temperature field of tissues subjected to microwave and radio-frequency electromagnetic radiation. Currently, we are (1) experimentally measuring the patterns of energy deposition within various types of extremity phantoms produced by a Mini-Annular Phased Array (MAPA) applicator; (2) theoretically describing the electromagnetic fields of a MAPA in terms of its design paramters; (3) theoretically describing the transient thermal profiles within limbs produced by a MAPA; and (4) theoretically describing the systemic temperature and cardiac changes associated with heating various regions of the body. We are also performing electromagnetic and thermal modeling of the unwanted non-local energy deposition occuring outside the bounds of typical hyperthermia applicators. These studies are forming the basis for the clinical system currently under construction.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10110-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
A Dual 3-Dimensional Position Monitor For Speech Analysis: MOD. II

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

E.C. Walker, Mechanical Engineer, ACES BEIB

Other Investigators
T.L. Talbot, Mechanical Engineer ACES BEIB
C.L. Ludlow, LCD NINCDS
F. Plowman, ACES, BEIB

COOPERATING UNITS *(if any)*
LCD-NINCDS

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.25	.25	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Several speech monitoring instruments have been designed to study the etiology of normal and abnormal articular movements in humans. The first system, which is in current use, provided a unique method of monitoring 3-D lip and jaw movements. The second system, MOD II, is an improved version of the first. The device consists of two mirror image transducers mounted on a common head frame. Each transducer, which can be individually adjusted, is capable of measuring the movement of a point in three orthogonal planes. The transducers have been structurally and operationally redesigned to provide increased linearity, resolution, and reduced weight. Additionally, the head frame has been totally redesigned to provide improved wearing comfort and reduced weight. The improved system will facilitate studying a broader patient population such as children and the elderly.

Design and fabrication of MOD II has been completed. Results of bench tests indicate that the system performs well, within its specified range. Future efforts will be directed toward patient testing.

Following system enhancement, patient testing will be scheduled for the upcoming fiscal year.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10112-06 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Analysis of Microcirculatory Blood Flow by Laser Doppler Scattering

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
R.F. Bonner, Physicist, BEIB, DRS
T.R. Clem, Elect. Engineer, BEIB, DRS
M. Kaliner, Section Chief LCI NIAID
H. Druce, Clinical Assoc. LCI NIAID
G. Rogers, Clinical Assoc. LCI NIADDK
M. Roy, Visiting Scientist NEI
D. Goldstein, Sr. Invest. HB NHLBI; H. Kaiser, Chief HB NHLBI
E. Oldfield, Neurosurgeon SN NINCDS; R. Blacklock, Clinical Assoc. SN NINCDS

COOPERATING UNITS *(if any)* HB, NHLBI; CB NEI; LCI, NIAID; ROB, NCI; SN, NINCDS; LAP, DCRT; MedPacific,Inc, Seattle,WA; TSI, Inc, St. Paul,MI; International Diabetes Center, Minneapolis, MI; Neurology and Gastroenterology Depts., USUHS, Bethesda, MD,Dept. Medicine, Med. Coll. S. Carolina, Charleston, SC.

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Electrical and Electronic Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	1.0	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

This project has developed a clinically useful method (Laser Doppler instrument and its theory of operation) for clinical measurements of microcirculatory blood flow, number density of flowing RBC's, and mean RBC velocity. Assistance has been given to the commercialization of this methodology and its application to clinical research in many laboratories worldwide. At the NIH our clinical studies have been directed to examining normal and abnormal microvascular dynamics through noninvasive clinical studies (of skin and nasal mucosa) and in intra-operative clinical studies (of muscle and CNS). Collaboration with USUHS is directed at developing endoscopic application of this technology. Considerable theoretical work has been directed toward an adequate construct with which to intercept the physical measurements and refining the accuracy of the microcirculatory measurements. We have discovered abnormal microcirculatory patterns and responses in the skin of patients with sickle cell disease, hypertension, certain cardiac circulatory syndromes, diabetes and skin cancer. The microcirculatory effects of therapy are monitored with this technique in these patients affording a better understanding of the microcirculatory component of these diseases.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10116-05 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Modeling of Arterial Pulse Waves

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.S. Chadwick,	Biomedical Engineer,	BEIB,DRS
D. Goldstein,	Senior Investigator	EHL, NHLBI
H. Kaiser,	Chief EHL,	NHLBI

COOPERATING UNITS *(if any)*

NHLBI, Endocrine-Hypertension Laboratory

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.25	.25	

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A pulse wave theory and a model of the human brachial arterial system is developed that predicts the changes in the arterial pressure waveforms as it traverses the vasculature - increased pulse, sharper main wave, disappearance of the aortic incisura, and appearance of a diastolic dicrotic wave. It also predicts the observed modulation of the waveform during phenylephrine - induced vasoconstriction and nitroglycerin - induced vasodilation. The model considers the brachial arterial system as a tapered distensible tube ending in a loop, with side branch networks represented by distributed Windkessels, and it uses verifiable values for realistic parameters. We found that the vertical modulation of the dicrotic wave in people decreased with advancing age and with high blood pressure, the model explaining these finding in terms of increasing vascular rigidity and decreasing small vessel vasodilator responsiveness. We noted a significant negative correlation between the arterial level of plasma norepinephrine and the amount of modulation of the dicrotic wave after nitroglycerin among subjects 40 years old or younger, suggesting a sympathetic neurogenic contribution to the vascular abnormalities observed in relatively young patients with essential hypertension.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10122-05 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Micro-computer Applications for the NIH Bio-Technology Unit (Pilot Plant)

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

T.R. Clem, Sr., Electronics Engineer, EEES, BEIB, DRS

Other Investigators:

Y. Shiloach	Chief, Bio-Technology Unit	LCDB NIADDK
A. LeRoy	Chemical Engineer	BEIB, DRS

COOPERATING UNITS *(if any)*

LCDB - NIADDK

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	0.75	0.25

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The NIH Bio-Technology Unit (Pilot Plant) has various instrumentation needs that have not been previously addressed or are currently using cumbersome techniques and/or outdated equipment. This project has been concerned with satisfying these instrumentation needs using modern equipment and low cost desktop size Personal Computers. Several PC's have been acquired and are being installed to supply a variety of services which include process control, data acquisition, data analysis, and administrative functions. The instrumentation and process control functions utilize commercial equipment, such as possible, and are interfaced using standard I/O connections such as the IEEE-488 GPIB and the RS-232 Serial I/O ports.

Using these techniques allows changes in the parameters measured or controlled, or scaling to different size vessels to be accomplished relatively quickly and easily. Utilizing the computational capabilities of the computer/controller allows initial selection of the operating parameters and dynamic alteration of these parameters as the process continues, thus allowing optimization of yields or detailed study of the process parameters.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10132-05 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Image Processing and Cell Classification

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

J.R. Ellis	Expert	BEIB, DRS
C.C. Gibson	Electronics Engineer	BEIB, DRS
M.A. Greenwood		SNB, NINCDS
G.H. Hook		SNB, NINCDS

COOPERATING UNITS *(if any)*

SNB, NINCDS

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Office of the Chief

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.25	0.15	0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

In vitro cell culture is an effective method for the study of the effects of chemotherapeutic agents on neurological tumors. Quantitation of all but the most rudimentary of these effects is generally beyond the ability of human observers. Thus, an automated system for acquisition of image data, extraction of parameters of interest, and statistical processing of results is necessary for any quantitative effectiveness.

Historically, this field has been qualitative. Thus, moving toward quantitative evaluations has involved a very broad spectrum of discussions about methods, limitations of methods, desired results, and significance of results. In addition, it has been necessary to clarify the strong and weak points of human and automated image processing, and to determine those problems which require a combination of the two methods.

Morphology studies using size, aspect ratio, and a shape factor were begun some time ago on micrographs of granules and mitochondria of Glioma tumor cell lines treated in-vitro with AZQ, BCNU, and other drugs. These studies have recently been resurrected.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10146-04 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Prosthetic Urethral Sphincter

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

S. B. Leighton, Mechanical Engineer, BEIB, DRS,
Steven Scoog, M.D. WRAMC
T. Rade Baugh, BRCM, NIA

COOPERATING UNITS *(if any)*
BRCM, NIA
DCT, NCI

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section,

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.05	.05	0

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A number of techniques are used for treating urinary incontinence, including a number of artificial prosthetic sphincters. The present work concerns an entirely intraurethral artificial sphincter that can be implanted without surgery. Concepts are being explored which would allow the device to be used in situations in which surgery is contraindicated, and would also presumably lower the cost. The valve would be appropriately matched to urethral dimensions, pressures, and flowrates. The valve would be potentially useful in cases of nonopening normal valves as well as in cases of non-closing valves.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10151-04 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Nuclear Magnetic Resonance Imaging

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Dr. David I. Hoult, Physical Scientist, BEIB, DRS

Other personnel:
Dr. Ching-Nien Chen, Expert
Dr. Victor J. Sank, Expert
Dr. L. Kyle Hedges, Staff fellow

COOPERATING UNITS *(if any)*
Department of Radiology, Clinical Center

LAB/BRANCH
NMR Imaging Laboratory, Biomedical Engineering and Instrumentation

SECTION
Office of the Chief

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
3.0	2.8	0.2

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
 ☐ (a1) Minors
 ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A considerable amount of work has been put into the rf probe design for the 3-dimensional rotating frame NMR imaging method, at 5 MHz, as an extension from our previous 2D projects. Because of limitation in geometry, the coils interact strongly rendering impossible individual tuning and matching by conventional means. We have successfully devised circuits to overcome these difficulties. The same principle can be utilized in other similarly coupled rf coils. Existing softwares are modified and expanded to accommodate the new hardware for data collection and reduction.

A FORTRAN program package is being developed to give numerical solutions to the Bloch-Riccati equations for arbitrary rf pulses.

A preliminary investigation has been conducted with regard to spectral treatment by the maximum entropy method, which has been introduced to the NMR field recently to improve the signal-to-noise ratio.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10156-04 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Differential Scanning Calorimeter

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.P. Mudd, Biomedical Engineer,	ACES, BEIB, DRS
T. Talbot, Mechanical Engineer,	ACES, BEIB, DRS
P.D. Ross, Physical Chemist,	A LMB, NIADDK

COOPERATING UNITS *(if any)*

A LMB, NIADDK

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda. MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.3	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The application of sensor design techniques from earlier work in heat conduction calorimeters to scanning calorimeter design has resulted in a scanning calorimeter which has a 10-fold increase in its effective sensitivity. Unfortunately, the high temperature scanning associated with this calorimeter has produced unexplained and random failures in the thermopiles which create an unacceptable increase in the baseline noise. Since these sensors are manufactured for use as heat pumps (Peltier mode of operation) and not sensors (Seebeck mode of operation), the manufacturers can supply no information on expected noise performance. We have therefore initiated a program to evaluate the noise and failure modes of these devices from different manufacturers. In the process of evaluating these devices, we will also measure their Seebeck sensitivity as an aid in matching the channel sensitivities in the scanning calorimeter.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10157-03

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Temperature Controlled Chamber for X-ray Diffraction Specimens

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
C.P. Mudd, Biomedical Engineer, ACES, BEIB, DRS
H.W. Tipton, Mechanical Engineering Tech., ACES, BEIB, DRS
A.V. Parsegian, Researcher, CR, PSL
B.K. Lee, Researcher, CR, PSL
D. Rau, A, LCP

COOPERATING UNITS *(if any)*
DCRT. Cr-PSL

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.2	0.2	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A prototype chamber was constructed of polycarbonate and aluminum with a beryllium window to allow the entry of the x-ray beam. The cell containing the specimen is loaded into a holder next to the window. The bottom of the holder is held in contact with one side of a Peltier solid state heat pump. The opposite side of the heat pump is clamped to the aluminium bottom of the chamber which serves as the heat sink. In this early version, a thermistor was used to control the heat pump to keep the specimen at the set temperature. The film plate is mounted inside the chamber on an adjustable slide. Based on the success of this prototype, two more chambers were requested with different focal lengths. The new units were designed with an improved temperature controller. The new unit incorporates a linear feedback sensor with a bipolar supply to allow automatic switching from cooling to heating. The set temperature is fixed by a 3 digit thumbwheel switch and the sample temperature is read out on a $3^1/2$ digit display. This new sytem will hold the sample temperature between -3°C and 85°C with a stability of 0.02° C.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10159-05 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Pathophysiology of Cachexia in Sarcoma Patients

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
R. Corsey, Electronic Engineer BEIB, DRS

J.A. Norton, Section Chief, SURG, NCI
R. Inculet, Research Associate, NCI

COOPERATING UNITS *(if any)*
Nutrition Department,Clinical Center, NIH
Nursing Department, Clinical Center, NIH

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.0	1.5	0.5

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☒ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

This study is designed to explore alterations in metabolic demand which sarcomas imposed on patients. Since soft-tissue sarcomas have been shown to be metabolically active tumors and NCI is treating a large number of patients with extremity and truncal sarcomas this study will be limited to sarcoma patients. Of particular interest is the following:

1. Is there any alteration in resting energy expenditure due to the presence of the tumor?

2. Is there any alteration in body cell mass prior to the onset of cachexia?

Previous studies have been limited to very sick patients or small numbers of patients. This study will attempt to further our understandig of the pathophysiology of covert cachexia before it becomes clinically evident. Patients and volunteers will be matched with respect to age, sex, and body surface area.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10162-04 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Wound Healing: Biology and Rheology

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Thomas L. Talbot, MS, ACES, BEIB
Walter T. Lawrence M.D., C. Surgery, NCI
Lawrence E. Thibault, ScD. Bioengineering Dept, Univ. of Pa

COOPERATING UNITS *(if any)*
NCI, University of Pa, Philadelphia, Pa

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.2	1	0.2

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Preliminary studies have been completed with swine models. These studies involved stamping an indelible grid (10cmx10cm) on the skin of the swine, and the excision of a 1 cm by 10 cm strip of the skin out of the grid area, and finally approximating the incision edges with silk sutures. Photographs of the grid were taken before excision, after excision, and after suturing. These photographs will be analyzed to determine the impressed strain on the wound closure and eventually relate this information to wound breaking strength (WBS).

Studies based on a rat model that relate biologic and pharmacologic interventions to WBS have been completed. Certain groups were treated pharmacologically during the wound healing process. Significant decrease in WBS was observed in these groups as compared to control groups. Further studies will include the comparison of tumor bearing group to control groups.

Rats treated with 8 mg/kg Adriamycin prior to or on the day of wounding demonstrated decreased wound breaking strength in incisional wounds at all intervals after wounding. Decreased amounts of collagen and DNA, lower mitotic rates, and decreased cellularity were noted in wound chambers from rats treated in this manner. In both the incisional wound and wound chamber models, rats treated with Adriamycin seven days after wounding showed a less dramatic healing impairment. No differences in collagen type were noted between chambers from the Adriamycin treated and untreated rats. The data suggest that deficient quantities of platelet, macrophage, and lymphocyte factors; a decreased rate of collagen synthesis, and impaired collagen remodelling all contribute to the Adriamycin induced healing impairment.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10163-04 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Magnetoencephalographic Localization of Foci of Neurologic Activity

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	P.D. Smith	Physicist	BEIB	DRS
others	J.L. White	Electronic Eng.	BEIB	DRS
	W.S. Friauf	Chief	BEIB	DRS
	S. Sato	Neurologist	OCD	NINCDS
	D. Rose	Clinical Assoc.	MNB	NINCDS
	R. Porter	Chief	MNB	NINCDS

COOPERATING UNITS *(if any)*
Medical Neurology Branch, NINCDS

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.5	1.5	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

SQUID magnetometers have been used to study the magnetic activity associated with spike discharges occurring in interictal periods in patients with temporal lobe epilepsy. Magnetic field maps associated with specific spike discharges were obtained from measurements made with the SQUID at various locations on the skull. Mathematical models, which accounted for the head shape of the patient and the orientation of the SQUID, were developed to calculate the predicted magnetic field maps. These comparisons of the experimental and theoretical data indicate close agreement in some areas, but significant deviations in others, which are not explained by skull topography alone. A seven-channel SQUID has been obtained and is being evaluated.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10170-04 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Biological Applications of a Computer Controlled Analytical Electron Microscope

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.D. Leapman	Visiting Scientist	BEIB, DRS
Others:		
C.E. Fiori	Physical Scientist	BEIB, DRS
C.R. Swyt	Physical Scientist	BEIB, DRS
K.E. Gorlen	Electronic Engineer	CSL, DCRT
C.C. Gibson	Electronic Engineer	BEIB, DCRT

COOPERATING UNITS *(if any)*

CSLT, DCRT

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.5	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Analytical methods have been developed and applied to electron energy loss spectra (EELS) and energy-dispersive X-ray spectra (EDXS) as well as their corresponding two-dimensional elemental maps produced by the computer-controlled analytical electron microscope in BEIB. Deconvolution algorithms developed earlier in the group have been applied to EELS spectra from cryosections of rapidly-frozen chromaffin cells in order to remove effects of plural inelastic scattering and to increase visibility of weak spectral features. In EELS elemental maps counting statistics are not high enough for a complete removal of plural inelastic scattering but sample-thickness effects can be corrected to first order by dividing the core loss signal by the zero-loss signal. Different algorithms for handling X-ray spectra have also been developed and comparison made in terms of accuracy and speed.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10184-03 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Physical Chemistry of Biological Macromolecules

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Marc S. Lewis	Research Chemist	BEIB/DRS
S.I. Chung	Research Chemist	LB NIDR
C.B. Klee	Section Chief	LB NCI
R.E. Lippoldt	HSO Dir., USPHS	CEB NIDDK
S.W. Luborsky	Research Chemist	DCBD NCI
K. Prasad	Visiting Fellow	CEB NIDDK
R.J. Youle	Research Chemist	SNB NINCDS

COOPERATING UNITS *(if any)*
LB/NIDR, LBDA/NIDR, SNB/NINCDS

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Analytical Methods

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.9	0.9	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of this project is to study the physical properties of a wide variety of biological macromolecules with the goal of correlating these properties to the structure and function of the macromolecules. The emphasis is on the thermodynamics of the interactions of these macromolecules and on their molecular size and shape. Analytical ultracentrifugation and mathematical modeling are the principal research techniques used.

Studies on the association of fibrinogen with other proteins involved in blood clotting and fibrinolysis have been continued and currently deal with the association of fibrinogen with plasma and platelet Factor XIII and with the association of plasminogen with the D and E fragments of fibrinogen.

Research on ricin has involved studies on a monoclonal antibody to the ricin B chain, the interaction of this antibody with ricin, and its effect on ricin toxicity both in vitro and in vivo. Research on the 27 S intermediate form of clathrin involved studies on the mechanism of formation of this form of clathrin and its relationship to the formation of clathrin baskets.

Studies on synapsin have been directed toward determining the molecular weight of the monomeric form of this protein and determining whether the aggregation which it undergoes is reversible, irreversible or a combination of both. Studies on cell adhesion peptides have been directed toward determining their mode of self-association, measuring the thermodynamic parameters characterizing their self-association, examining their possible interactions with each other and attempting to establish a relationship between their associative behavior and their primary structure.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10185-03 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Interventional Catheter Development

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

John W. Boretos, Physical Scientist, BEIB, DRS

Others:

John Doppman, M.D.	Radiologist	CR, CC, NIH
Edward Oldfield, M.D.	Neurosurgeon	NINCDS, NIH
Robert L. Dedrick, Ph.D.	Chem. Engr.	BEIB, DRS, NIH

COOPERATING UNITS *(if any)*
CR, CC, NIH; NS, NINCDS, NIH,
BEIB, DRS, NIH

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Chemical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.4	0.7	0.7

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of the project is to develop a catheter system for interventional radiology which is capable of traversing small and branching blood vessels (i.e. 1.5 to 4.0 mm) to reach the proximity of tumors and to administer chemotherapeutic drugs to these tumors in a controlled manner. A major obstacle to effective treatment is thought to be maldistribution of the drug at the site due to inadequate mixing with the blood. A multi-lumen catheter, which is propelled and directed through these small blood vessels via jets of fluid emanating from its distal end, continues to show promise for negotiating heretofore difficult to reach areas. Fluid turbulence generated by drug emanating at retrograde angles from the tip of the catheter adds significantly to the mixing of the drug within the blood stream. Animal tests have substantiated the feasibility of the catheter system for clinical use. A transparent model of the vascular network simulating blood flow of a pulsatile nature was designed to evaluate the efficiency of the jet flow at various delivering rates. A high torque roller pump using custom designed polyurethane tubing is capable of producing satisfactory infusion rates over an 8 hour period.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10187-03 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Mixing Studies during Infusion via Catheter

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.J. Lutz	DRS, BEIB	J. Boretos	DRS BEIB
R.L. Dedrick	DRS, BEIB	M. Bretz	DRS, BEIB
E. Oldfield	NINCDS, IR, SN	C. McClure	DRS, BEIB
J. Doppman	CC, DR		
D. Miller	CC, DR		
J. Collins	CC, DR		

COOPERATING UNITS *(if any)*
NINCDS
CC

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Chemical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.0	1.0	1.0

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Intravascular catheterization is a very common method of drug adminstration. Proper utilization of catheters requires knowledge of the physio-chemistry of the drugs in solution, the relevant pharmacokinetics of drug disposition, and in some instances the fluid mechanical events that occur as solutions are infused into the blood stream. For example, intra-arterial chemotherapy offers an alternative to systemic (iv) chemotherapy for localized neoplasms. Infusion of chemotherapeutic agents directly into the arterial supply of a tumor can allow high local drug concentrations in the tumor-bearing tissue while minimizing systemic toxicity. Application of this procedure in patients has produced varied results. For example, intracarotid infusions of cisplatin and BCNU have shown some evidence of regression of glioblastomas, but have also resulted in frequent episodes of leukoencephalopathies and other focal lesions, such as ophthalmic toxicity. These findings suggest the influence of streaming of the drug solutions from the catheter tip and inadequate mixing and distribution to distal tissue regions. This hypothesis was verified in an in-vitro flow model of the human carotid artery system. The results of dye injection studies indicated that streaming is likely to occur during low infusion rates, and that mixing can be enhanced by increasing infusion velocities, by improving catheter tip design, and also by modifying the mode of injection such as infusing transverse or retrograde to the blood flow.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10191-03 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Continuous Optical Monitoring for Bacterial Cultures

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

G.M. Maxwell	Staff Fellow	BEIB, DRS
S.B. Leighton	Senior Engineer	BEIB, DRS
Ernst Freese	Chief	LMB, NINCDS
S.A. Robrish	Scientist	LMI, NIDR
Y. Shiloch	Chief, Pilot Plant	LCDB, NIADDK

COOPERATING UNITS *(if any)*
LMB, NINCDS
LMI, NIDR
LCDB, NIADDK

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section,

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.3	.3	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The incubation of bacterial cultures is a standard laboratory technique in numerous biological studies. Monitoring the growth of these cultures in a shaker bath or fermenter currently requires frequent manual sampling. The work on this project has been aimed at developing a system capable of continuously monitoring growth in situ using optical measurement techniques.

To date the work has demonstrated the feasibility of making these measurements in shaker flasks employing an immersed detection system and yielded a prototype system for this application. Additional efforts have been directed at designing a system which will operate in a commercial type fermenter. The principal problem of eliminating gas bubbles in the optical path of the immersed probe has been solved.

The shaker flask probe consist of a light emitting diode and a photodetector mounted a right angles to one another in a fixed submersible head. Readings are taken at intervals of one minute under control of a computer system which also collects and process data.

The fermenter probe is of a similar design except that the optics are kept in a bubble free region of the housing.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10193-03 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Development of Everting Toposcopic Catheter for Clinical Gastroenterological Use

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

D.R. Shook, Biomedical Engineer, BEIB,DRS

COOPERATING UNITS *(if any)*

Georgetown University Medical Center (E.L. Cattau); Esophageal, Gastric and Colonic Diseases, Digestive Diseases and Nutrition Division, NIADDKD (K.J. Vener).

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Mechanical Engineering Section,

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: 0.2	PROFESSIONAL: 0.2	OTHER:

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The unique characteristics of the everting catheter have suggested its application in the gastrointestinal system. The operation of the catheter promises to facilitate the catheterization of the pancreatobiliary ducts through the Papilla of Vater. An initial series of patients has undergone routine endoscopic retrograde cholangiopancreatography (ERCP) using the catheter for contrast infusion. An extensively modified catheter is passed through an appropriately positioned endoscope. The catheter tip is placed within the ampulla, and the element is everted. In basic ERCP, contrast medium is then injected for diagnostic procedures. Catheter modifications include an overall lengthening to approximately 200 cm, while eliminating any added length to the everting element beyond that required by the clinical procedure. This keeps frictional drag of the element to a minimum. Where kinking of the tip of the primary catheter in the elevator of the scope presents a problem, reinforcement of the tip or a change to PTFE materials is made. In addition, the catheter's ability to atraumatically negotiate small, tortuous ducts is being investigated for catheterization of remote pancreatic and cystic ducts for sampling of pure secretions, placement of biliary stents, and conveyance of CCD television cameras.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10194-03 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Optimized Polymer Processing for Advanced Catheter Development

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

D.R. Shook, Biomedical Engineer, BEIB, DRS

COOPERATING UNITS *(if any)*
Diagnostic Radiology, CC (J.L. Doppman); Esophogeal, Gastric and Colonic Diseases, Digestive Diseases and Nutrition Division, NIADDKD (K.S. Vener)

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.05	0.05	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Advanced techniques of plasticating extrusion can produce materials of optimized anisotropic properties and very fine dimensional characteristics. Availability of such materials then supports development of unique polymeric medical devices, such as the everting catheter. Unique polymer resins are first characterized specifically for extrusion characteristics, and predictive models of rheological behavior are constructed. Die designs can now be implemented to take advantage of unique polymer character and to overcome the most critical processing difficulties. The models may also be used to eliminate certain polymers from consideration. Current efforts are to optimize the catheter material for maximally safe operation and to allow development for arterial dilatation.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10201-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Automated Cell Colony Scanner System

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Dr. Seth Goldstein, Chief, Mechanical Engineering Section, BEIB, DRS
Dr. Michael Brownstein, Chief, Laboratory of Cell Biology, NIMH

COOPERATING UNITS *(if any)*

Laboratory of Cell Biology, NIMH

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	.7	.3

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A system is being developed for the purpose of identifying, for subsequent cloning, a minute fraction of cells possessing a specific antibody or other fluorescent tag. Major emphasis will be put on making the system as simple and inexpensive and readily available to investigators as possible. A variety of concepts and techniques were identified and evaluated, and the most promising has been developed into a computer controlled instrument.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10202-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Optical Techniques for Dental Instrumentation

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
G.M. Maxwell, Senior Staff Fellow, BEIB, DRS
R.L. Webber, Chief, CIB, NIDR

COOPERATING UNITS *(if any)*
CIB, NIDR

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: .3	PROFESSIONAL: .3	OTHER:

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

An issue of importance in clinical dentistry is the assessment of a tooth's viability. Because of the inherent difficulties in current methods of assessment, optical techniques are being explored as alternatives. Tooth viability is being examined by developing a system which can detect the presence of hemoglobin in the tooth by its absorption characteristics at 585 nm. This system uses a high intensity halogen light source and two narrow band interference filters to measure the ratio of the light intensity exiting the tooth at 585 nm to that at 595 nm. Light is delivered to the tooth by a fiber optic bundle and collected by a bifurcated bundle. An analogue divider continuously computes and displays the ratio of light intensity at the two wavelengths.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10203-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Clinical Assessment of Arterial Mechanical Properties

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

G.M. Maxwell, Senior Staff Fellow, BEIB, DRS
R. Chadwick, Biomedical Engineer, BEIB, DRS
D. Goldstein, Senior Investigator, IR, HE, NHLBI

COOPERATING UNITS *(if any)*
IR HE, NHLBI

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.3	.3	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of this research is to develop an appropriate instrumentation system and associated data analysis techniques for evaluating the in-vivo mechanical properties of the brachial artery. Of particular interest is arterial distensibility, which can be evaluated in several ways. The most straightforward technique involves simultaneous measurement of arterial pressure and vessel diameter. An indirect and qualitative approach is also possible by analysis of the velocity waveform, a technique which can be performed non-invasively. Additionally, there are several theoretical formulations for arterial distensibility. Work on this project will be directed towards evaluating these various techniques to determine the limitations and advantages of each and to develop an instrumentation system suitable for routine clinical assessment of arterial mechanical properties.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10204-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Cell Handling Studies

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
S.B. Leighton, Mechanical Engineer, BEIB, DRS
J.A. Berzofsky M.D., DCBD, NCI

COOPERATING UNITS *(if any)*
DCBD, NCI

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.3	.3	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

It is desireable to handle and process individual cells for monoclonal antibody work and other research endeavors. We are investigating a number of modalities for this, including flow cytometry, micromanipulators, dielectrophoresis, micropipettes, microtitre trays, and tissue culture techniques. We are considering sorting, storing, transporting and selectively inactivating cells. In addition, we are considering magnetic, gradient density, antigen-antibody, and solubility difference methods as possible candidates for separation techniques.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10205-02 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Constant Shear Field Apparatus for ESR Studies

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

S.B. Leighton, Mechanical Engineer, BEIB, DRS
H. Kon, Research Chemist, LCP, NIADDK

COOPERATING UNITS *(if any)*

LCP, NIADDK

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS: .2	PROFESSIONAL: .1	OTHER: .1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Electron Spin Resonance (ESR) is a valuable technique for studying membrane bound proteins. In particular, it can be used to study labeled proteins in red blood cell membranes. In order to know the orientations of the proteins with respect to the membranes, it is necessary to orient the membranes with respect to the ESR device. A fluid shear field serves the purpose of orientation, since the red blood cells are discoid and distensible. However, flow in capillary tubes, although functional and simple, provides a non-uniform shear field due to the Poiseuille velocity distribution. We are planning to use a moving thin polyester tape to create a uniform shear field and hence sharper resolution of orientation and a better signal to noise ratio.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10206-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Concentration Uniformity by Diastolic Phasing of Pulsed Intra-Arterial Infusions

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
D.R. Shook, Biomedical Engineer, BEIB, DRS
J.L. Doppman, Chief, DRD, CC

COOPERATING UNITS *(if any)*
Diagnostic Radiology, CC (J.L. Doppman); Chemical Engineering Section, BEIB, DRS (R.J. Lutz)

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.00	0.55	0.45

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Inadequate infusate/blood mixing during intra-arterial chemotherapy at low catheter infusion rates (1 ml/min) produces highly nonuniform downstream drug concentrations. Inadequate treatment of the lesion and overexposure of normal tissues may result. Studies are underway to investigate the advantage of diastolically phased, high flow rate, pulsed intra-arterial infusions in effecting uniform downstream concentrations. Triggered by the ECG, a high velocity pulse during the interval of lowest blood velocity and retriggered on successive cardiac cycles, will yield average flow rates at the desired therapeutic value. Apparatus to produce that pulsed flow and methods of *in vivo* evaluation of downstream concentration uniformity are being developed. Highly realistic flow studies in an accurate model of the superior carotid artery and cerebral branches have demonstrated high essentially complete concentration uniformity as determined by spectrophotometric comparison of infusate dye concentrations in all downstream branches. The apparatus has been optimized for animal and clinical use, and pulsed intra-arterial infusions have been used in low flow rate clinical chemotherapeutic treatments, and in amimals for clinical evaluation.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10207-02 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Clinical Engineering Program for the Clinical Center Patient Areas

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. Corsey, Electronic Engineer, ACES, BEIB
L. Eldridge, Associate Hospital Administrator, CC
C. Strong, Environmental Safety Officer, CC
J. Harrison, Building Services Manager, CC
R. Bruun, Associate Hospital Administrator, CC
J. Decker, Director, CC
S. Galen, Associate Hospital Administrator, CC

COOPERATING UNITS *(if any)*

Clinical Care Instrumentation Section, DRS, NIH
Nursing Department, CC, NIH

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.4	0.15	0.25

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A comprehensive program of clinical engineering is provided for all patient-care areas of the Clinical Center. This consists of selecting equipment testing standards, designing test equipment, performing safety and performance tests, assuring hospital compliance with applicable standards of the Joint Commission on Accreditation of Hospitals, assuring hospital compliance with other pertinent standards such as the National Electric Code and the Standard for Health Care Facilities,investigating electric shocks to patients and employees, providing engineering expertise to hospital standing committees such as the Clinical Center Safety Committee and the Clinical Center Standardization Committee (equipment), providing education in the form of lectures seminars and "in service" demonstrations, designing and modifying equipment for clinical and research use, correcting equipment malfunctions through interface with manufacturers and the Center for Devices and Radiological Health, FDA, and the Emergency Care Research Institute and participation in patient care product recalls and seizures.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10208-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Hemodynamic Principles in the Control of Coronary Blood Flow

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
Thomas L. Talbot, MS, ACES, BEIB
Stephen E. Epstein, M.D. Cardiology, NHLBI
Richard O. Cannon, III, M.D. Cardiology, NHLBI

COOPERATING UNITS *(if any)*
Cardiology Branch, NHLBI

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.75	.75	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The effects of atherosclerotic epicardial stenosis on coronary vascular resistance can be understood in terms of basic fluid mechanical principles. Resistance is directly related to the trans-stenotic pressure drop and inversely related to flow. However, even with a fixed anatomic stenosis, resistance is not fixed; it increases as trans-stenotic flow increases. This exacerbates the pressure drop across the stenosis that develops as a result of flow; at high flows, large pressure drops can occur. This characteristic of flow through stenotic lesions can contribute to a "steal" physiology, between either epicardial or intramural coronary arteries. Studies have also shown the clinical importance and influence of dynamic alterations in coronary resistance, occurring either at the large or small vessel level. In addition, compressive forces exerted by the myocardium or by elevated intraventricular pressures can increase coronary vascular resistance, and therefore can interfere with myocardial perfusion. All these factors must be considered in order to understand the mechanisms leading to myocardial ischemia, and therefore to the clinical syndrome of angina pectoris.

Further studies have shown the complex interaction of the coronary vessels and the peripherical vascular bed. The vessels of each group were treated as resistance vessels either in series or in parallel configuration. The results have demonstrated dramatically the individual and collective contribution of these vessels towards the maintenance if sufficient myocardial perfusion.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10209-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Evaluation of Disposable Blood Pressure Transducers

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
E.C. Walker, Mechanical Engineer, ACES, BEIB
T.L. Talbot, Mechanical Engineer, ACES, BEIB
R.E. Clark M.D. Chief, Heart Surgery, NHLBI
D.P. Dolan, CC, CCM

COOPERATING UNITS *(if any)*
NHLBI, Heart Surgery
CC, ICU
CC, Critical Care Medicine

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.25	.25	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A sample of each manufacturer of disposable blood pressure transducers was tested for compliance to AAMI's specifications for these devices. The data are currently being compiled for presentation to those responsible for placing these devices in use throughout the Clinical Center. The data do not represent an official endorsement of a particular device.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10210-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Electronic Patient Monitoring System

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
H.E. Cascio, Electronic Engineer, BEIB, DRS
G. Hemphill, Engineering Technician, BEIB, DRS
K. Musallam, Head Nurse, CCNURS
D. Cirelli, Administrator Officer, CC, OD

COOPERATING UNITS *(if any)*
CCOD

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.8	0.3	0.5

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

An electronic patient monitoring system that alerts the nursing staff when a patient (or patients) is leaving the nursing unit is a welcome aid in the care of Alzheimer's Disease patients and other patients with dementing illnesses. The system design is based on a wrist watch size radio transmitter, worn by the patient. A detector unit, placed at the two doors, senses the presence of any patient wearing a transmitter watch. With the detection of a patient's transmitter, a microprocessor based controller locks the exiting door, activates an alarm, and displays the patient's name and location on a computer monitor screen. The personal computer would record the time and date for each patient's attempt to leave. This data would then be used for statistical analysis.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10211-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
IEEE-488 GPIB and Personal Computer Instrumentation Use Program Development

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

T.R. Clem, Sr., Electronic Engineer, EEES, BEIB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.25	0.2	0.05

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The increased availability and reduced cost of the small Personal Computer has created increased interest in automating data acquisition and process or experiment control in areas where such things were not feasible before due to cost or complexity. With these changes also came a significant increase in the use of the IEEE-488 GPIB by instrument makers. By combining the two, sophisticated instrumentation and data acquisition systems can be assembled quickly and inexpensively. The BEIB is continuing to develop the expertise to provide guidance and assistance to requirements where this approach provides the optimum solution. This capability is further assisted by the BEIB-SERP specifying the IEEE-488 interface on new equipment acquisitions whenever possible. The increase at the NIH in the numbers and use of the IBM PC has made this capability of great value to the NIH Intramural Research program.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10212-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Fluoroimmunoassay Apparatus

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

W.S. Friauf	Chief, EEES	BEIB, DRS
R.L. Berger	Physicist	LTD, NHLBI
G. Hemphill	Electronic Tech.	BEIB, DRS

COOPERATING UNITS *(if any)*
CDC, Atlanta

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.2	0.1

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

New rare earth chelate fluorescent probes with a decay time constant much longer than the background decay time-constant of typical organic materials offer the potential of a great improvement in sensitivity of time resolved fluorimetry. However, to rival radioimmunoassay methods the required sensitivity improvement is so great that overload recovery of the fluorescence detector is a major problem. Extensive past work on this problem is largely inapplicable to the very low speed and level requirements of this situation. Consequently initial effort is being applied to determining the optimum fluorescence detection device and ancillary signal overload limiting circuitry. Problems related to the fluorescent probe at extremely low sample concentrations will be studied in collaboration with CDC, which is interested in this approach as another tool for AIDS research. Finally an evaluation of the details of excitation, optical filtering, and digital signal processing will be worked out and optimized.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10213-02 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Vitreous Fluorophotometry Analysis

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

P.M. Bungay	Chemical Engineer	BEIB, DRS
R.F. Bonner	Biophysicist	BEIB, DRS
M.S. Roy	Ophthalmologist	CB, NEI
M.J. Podgor	Statistician	BE, NEI

COOPERATING UNITS *(if any)*

Clinical Branch, NEI; Office of Biometry & Epidemiology, NEI

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Chemical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.5	0.5	1.0

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Vitreous fluorophotometry (VFP) is a clinical procedure for measuring the spatial distribution of fluorescence along the optical axis in a human subject's vitreous following administration of a fluorescent dye. In this project the clinical instrument is a Fluorotron Master manufactured by Coherent, Palo Alto, CA, and the dye is sodium fluorescein given by intravenous injection. The purpose of the project is to improve the protocols for conducting the measurements, processing the output from the instrument and analyzing the results from the population of normal volunteers and patients.

One disease to be considered is diabetes and the associated pathology diabetic retinopathy. The goals are to evaluate the procedure for use in (1) screening for early detection, and (2) monitoring for treatment efficacy. A pharmacokinetic mathematical model has been developed which describes the rate of appearance of fluorescein in the vitreous in terms of the blood-retinal barrier permeability (characterized by permeability coefficients of the retina-vitreous interface) and transport of fluorescein within the vitreous by diffusion (characterized by a diffusion coefficient). Plasma protein binding of fluorescein is also incorporated. Measurements have been made on 22 normal volunteers to evaluate the performance of the instrument, establish baseline parameter ranges, and critique existing protocols/analysis schemes.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10214-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Photoradiation Therapy

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	P.D. Smith	Physicist	BEIB	DRS
Others:	R.F. Bonner	Biophysicist	BEIB	DRS
	A. Russo	Section Chief	ROB	NCI
	M. Manyak	Staff Fellow	ROB	NCI
	D. Mathews	Veterinarian	VRB	DRS
	H. Pass	Surgeon	SURG	NCI

COOPERATING UNITS *(if any)*
ROB, NCI; VRB, DRS; SURG,NCI

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, Md 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.5	2.5	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Photodynamic therapy (PDT), which is the interaction of light with hematoporphrin derivative (HDP, Photofrin II), is being studied for possible clinical use in several areas. Currently, PDT is being investigated in the following: cancer of the prostate (beagles); carcinoma in situ of the bladder and urinary tract (foxhounds); and pulmonary metastatic disease (nude mice). Specially designed fiber optic probes and and introducers were manufactured for all cases, and calibrated in terms of irradiance delivered to the tissue. Photosensitised skin is a side effect of PDT, and the possibility of using agents to protect against this photosensitivity was addressed. In particular, hydrochlorothorazide appears to have a pronounced effect on reducing skin photosensitivity in nude mice models. Dosimetry for PDT is complex due to the variable irradiation levels within the tissue, sequestering of HDP, and tissue oxygenation. To address the first of these points and to permit light distribution within tissue to be formulated, measurements were made of light emanating from tissue as a function of radial distance from the point of injection of the light into the tissue. Theoretical analyses permit extraction of two parameters, the mean free path length between isotropic scattering events and the absorption coefficient, with and without the presence of HDP, for each of the tissues studied. These include muscle, bladder wall, liver, kidney, skin, etc. For these tissues, flux levels as a function of distance from the point of light injection have been established for three different wavelengths, 514nm, 660nm, and 780nm.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10215-02 BE1

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Measurement of Trace-Level Metals and Complexes in Biological Milieux

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
A.F. LeRoy, Ph.D., BEIB, DRS
M. Linnoila, M.D., Ph.D., CPB, NIMH
K. Flora, Ph.D., PRB, NCI
M.K. Wolpert, Ph.D., Drug Eval. Br., DCT, NCI
P. Galle, Prof. of Biophysics, Medical Faculty, Creteil, France
B. Hecquet, Ph.D.. Centre Oscar Lambret, Lille France
P. Parsons, Ph.D., BEIB, DRS

COOPERATING UNITS *(if any)*
CPB-NIMH, DCT-NCI, PRB-NCI, Biophysics Dept., Med. Faculty, Creteil, France: Centre Anti-cancereux "Oscar Lambret", Lille, France

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Analytical Methods

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.20	0.70	0.5

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Analytical methods have been developed for quantitation and characterization of metallic elements and their complex species present in biological samples at trace levels.

Analysis of vanadium in samples from human subjects under study has been conducted. Results obtained have shown very low concentrations, in the range of nanograms-of-vanadium-per-gram of sample. The very small amounts of CSF samples available make reliable, reproducible results difficult to assure.

Platinum complex behavior is under study for several different platinum-containing complex compounds used clinically. Chromatographic techniques are used to make separations of platinum complex species (bound and unbound to protein) in human plasma at clinically used concentration levels. Material balances suggest that all the platinum in the several fractions can be accounted for quantitatively. Analytical methods developed have been used to make kinetic studies of behavior of platinum species from cisplatin (including the parent complex, cis-diamminedichloroplatinum II (CDDP), and its transformation products) in plasma and to relate them to quantitation of protein in each fraction collected. Atomic Absorption Spectroscopy with electrothermal atomization is used to quantitate total platinum or single isolated species.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10216-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Enzyme Purification - Calmodulin

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
A.F. LeRoy Ph.D., BEIB/DRS
R. Berger, Ph.D., LTD, NHLBI

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Analytical Methods

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.1	0.1	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Validity of studies characterizing and measuring properties of calmodulin depend on having quantifiable measures of purity of the enzyme preparation and the proportion of calcium it contains and requires the availability of extremely pure reagents, buffer, and solvents and contamination free labware.

Analytical methods have been developed for quantitaiton of picogram quantities of calcium in highly purified preparations of calmodulin and in the reagents and solvents needed to make the preparations. Preliminary analyses show that the needed reagents and solvents for making ultra-pure enzyme preparations can be freed to satisfactory levels from such ubiquitous contaminants as calcium using techniques developed in our laboratory.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10218-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Analytical Electron Microscopy of Adrenal Chromaffin Cells

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.D. Leapman	Visiting Scientist	BEIB, DRS
Others:		
R.L. Ornberg	Biophysicist	LCBG, NIDDK
H. Pollard	Chief	LCBG, NIDDK

COOPERATING UNITS *(if any)*
Computer Systems Laboratory, Division of Computer Reserach and Technology, NIH (K.E.Gorlen)

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.7	0.7	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The elemental composition in various compartments of the bovine adrenal chromaffin cell was investigated by a combination of energy-dispersive x-ray spectroscopy and electron energy loss spectroscopy. Cryosections of quick-frozen cultured cells were transferred at low temperature (-170 C) into the Hitachi H700H analytical electron microscope and the samples were carefully dehydrated in situ. Spectra were recorded from: (1) secretory granules, (2) cytoplasm, (3) nuclei (4) mitochondria and (5) extracellular space. X-ray spectra were quantitated by means of specially prepared standards containing known amounts of protein and ions. Concentrations accurate to ± 5% or 10% could be established for most of the major elements. Electron energy loss spectra were analyzed with software developed in BEIB to determine ratios of nitrogen-to-phosphorus.

Experiments have been performed to investigate the effect of pH on catecholamine secretion and how this is correlated with changes in ionic distributions in the cell. Measurements have also been made on isolated secretory granules.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10219-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Quantitative Elemental Mapping of Rapidly-frozen Neural Tissue

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. D. Leapman	Visiting Scientist	BEIB
Others:		
S.B. Andrews	Special Expert	LN, NINCDS
T.S. Reese	Chief	LN, NINCDS
C.E. Fiori	Physical Scientist	BEIB, DRS
C.R. Swyt	Physical Scientist	BEIB, DRS

COOPERATING UNITS *(if any)*
Computer Systems Laboratory, Division of Computer Research and Technology, NIH (K. Gorlen)

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.5	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The elemental composition of the presynaptic and postsynaptic nerve terminals of rapidly-frozen synapses of the mouse cerebellar molecular layer was determined using electron probe x-ray microanalysis and elemental imaging by characteristic x-rays. Quantitative electron probe analysis of synaptic vesicle clusters and intraterminal mitochondria indicated that their calcium concentrations were 0.4 ± 0.1 and 1.2 ± 0.2 mmol/l respectively. Similar experiments were carried out on cerebellar slices rapidly frozen after incubation in vitro. The distribution of K and Ca in presynaptic terminals of resting and depolarized slices were qualitatively and quantitatively similar to those in fresh slices. Results suggest that the vesicles have a limited role in calcium storage and release. In contrast measurement of calcium in the postsynaptic region of the cerebellar molecular layer show evidence for calcium sequestration in a smooth membrane cistern of the derdritic process called the "spine".

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10221-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Elemental Imaging of Alveolar Macrophages

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
C.R. Swyt, Physical Scientist BEIB, DRS
C.E. Fiori, Physical Scientist, BEIB, DRS
R.D. Leapman, Visiting Scientist, BEIB, DRS
W. Rom, Senior Fellow, PB, NHLBI

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: 0.5	PROFESSIONAL: 0.5	OTHER:

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Refractile particles are observed by light microscopy (LM) in alveolar lavaged macrophages from patients exhibiting clinical symptoms of asbestosis, silicosis and coal-miner's emphysema. However the elemental composition and location of these particles in the ultrastructure of the macrophages cannot be determined by LM. Elemental x-ray images obtained in the CAMECA MBX microprobe from large fields of whole air-dried macrophages have enabled investigators to correlate particle composition with disease. High resolution images of individual macrophages in ultrathin sections of epon embeded preparations obtained in the Hitachi H700H analytical electron microscope utilizing bright field (BF), energy dispersive x-ray (EDS) and electron energy loss (EELS) signals have revealed both elemental composition and ultrastructural location of the particles.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10222-02 BEI

PERIOD COVERED
October 1, 1984 to September 30, 1985

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Elemental Distributions in Central Nervous System Tissues

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.R. Swyt	Physical Scientist	BEIB/DRS
R.M. Garruto	Senior Biologist	CNSS/NINCDS
C.E. Fiori	Physical Scientist	BEIB/DRS

COOPERATING UNITS *(if any)*
CNSS/NINCDS

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1	1	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The occurrence of neurofibrillary tangles and plaques is common to a number of central nervous system disorders including Guamanian amyotrophic lateral sclerosis (ALS), parkinsonism with dementia (PD), and Alzheimer's disease. These NFTs and plaques contain nonessential metals and elevated levels of biological elements. Fixed and frozen thick sections of hippocampus and frontal cortex of human brain from subjects exhibiting symptoms of these diseases have been examined in the CAMECA MBX microprobe. Wave length dispersive x-ray spectrometry (WDS) performed at selected areas has provided both spectra and digital images showing the distribution of elements of interest in the specimens.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10225-02 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Processing of High Resolution Electron Micrographs

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Michael Unser	Visiting Fellow	BEIB	DRS
Benes Trus	Research Chemist	CSL	DCRT
Alasdair C. Steven	Visiting Scientist	LPB	NIADDK

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Office of the Chief

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20205

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	1.0	.0

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

High resolution micrographs are often of poor quality, due to various distortions and especially to a very low signal-to-noise ratio. Visual quality can be improved significantly by using correlation-averaging techniques to combine several observations of similar subjects.

We had previously developed methods for translational and rotational alignment of different views of ostensibly identical specimens. These techniques have been extended for the compensation of spatial deformations in slightly distorted periodic structures.

Multivariate statistical techniques have been implemented for the analysis and comparison of sets of images. Quantitative approaches have been developed for the automated removal of anomalous views and the assessment of spatial properties of the resulting averaged image (e.g., rotational symmetry and resolution).

These methods have been applied successfully to structure determination and quantitative assessment of Herpes Simplex type II Virus capsomers, T7 Virus, and skeletal muscle filament images.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10227-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
In Vivo Evaluation of Pulsed Intra-Arterial Infusions

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

D.R. Shook,	Biomedical Engineer	BEIB, DRS
S. Saris,	Staff Neurosurgeon	SNB, NINCDS

COOPERATING UNITS *(if any)*
Diagnostic Radiology, CC; Surgical Neurology, NINCDS;
Veterinary Resources Branch, DRS

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.05	0.05	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Diastolically phased pulsed intra-arterial infusions have been shown to be an effective means to produce concentration uniformity in downstream branches of a model of the cerebral circulation. The technique is being evaluated in the cerebral circulation of fully anesthetized Rhesus monkeys by the infusion of radio-isotope labelled iodoantipyrine into the internal carotid artery. The resulting tissue concentration is determined by quantification of autoradiographs.

Initial results show high uniformity of tissue concentration, indicating that the deleterious effects of infusate streaming can be alleviated.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10228-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Automated Medication Dispenser

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
C.P. Mudd, Biomedical Engineer, ACES, BEIB, DRS
H. Tipton, Engineering Technician, ACES, BEIB, DRS
Russell T. Wall, Anesthesiologist, CC, ANES

COOPERATING UNITS *(if any)*
ANES, CC

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
ACES

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: 0.2	PROFESSIONAL: 0.2	OTHER:

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The automated medication dispenser consists of a timing system to release medication at prescribed intervals of 2, 3, or 4 hours and an electronic security system to prevent unauthorized access to the medication. One or two pills can be dispensed per dose interval to provide up to 24 pills/day for 3 days without reloading. When the dispenser is loaded, a two digit patient identification number, 00 to 99, is set on two thumbwheel switches located in the pill compartment. After loading the medication, the dispenser can be locked. With the dispenser in operation, the medication is released into a holding cell at the prescribed intervals. When the medication reaches the holding cell, a opto-electronic detector senses its presence and stops the timing process. At this time, the patient must perform two acts to obtain the medication: (1) enter the two digit identification number into the dispenser via two pushbutton switches next to the release bar, and (2) press the release bar. If the patient entered identification number agrees with internal preset number, the release bar is activated and will release the medication if it is present in the holding cell. If the patient entered number is incorrect or there is no medication in the holding cell, the release bar remains disabled and will not function. Any attempt on the release bar resets the number entered by the patient to 00. All attempts on the release bar are recorded for use in adjusting the dose rate.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10229 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
All Tantalum Stopped Flow Differential Micro-Calorimeter

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.P. Mudd,	Biomedical Engineer	ACES, BEIB, DRS
R. Berger,	Chemist	LTD, NHLBI

COOPERATING UNITS *(if any)*
LTD, NHLBI

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
ACES

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD, 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.3	

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
 ☐ (a1) Minors
 ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Based upon the sensor design techniques recently used in batch micro-calorimeters, we have devised an all tantalum stopped flow calorimeter with significantly greater sensitivity and faster response times. The tantalum flow assembly consists of two inlet tubes and one outlet tube which are electron-beam welded to a tantalum mixer. An array of small, fast response thermopiles are located on opposite sides of the outlet tube. The outlet tube contains a volume of 350 micro-liters. A 0.1 mm stainless wire is also attached to the outlet tube for use in calibration. Two such assemblies are used in this differential instrument. The sensing portion of the tubing is mounted in a large heat sink and kept at the core or operating temperature of the calorimeter. As the tubes enter and leave the heat sink, they are routed together so that thermal artifacts propagating down the tubes will appear as common-mode and not differential signals. The resulting instrument has a sensitivity of 1 joule/volt*second and a 10 to 90% step response of 48 seconds.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10230-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Television Tracking of Beating Heart Cells in-vitro

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

W. Schuette,	Chief	ACES, BEIB, DRS, NIH
J. Parrillo,	Chief	CCMD, CC, NIH
C. Burch		CCMD, CC, NIH

COOPERATING UNITS *(if any)*
DRS, BEIB
CCMD, CC

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD, 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	0.6	0.4

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A Television Tracking System has been developed to measure the motion of beating Heart Cells in-vitro. The performance of these cells is used to monitor the presence of a circulating Myocardial Depressant Substance in Humans with septic shock. Beating myocardial cells were placed in a petri dish on the microscope stage at an inverted microscope and imaged by a television camera. Motion voltages were developed from the resultant television video by the tracking system.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10231-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Instrumentation Development for Fluorescence Spectroscopy

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

J.L. White,	Electronic Engineer	EEES, BEIB, DRS
J.R. Knutson,	Sr. Staff Fellow	LTD, NHLBI

COOPERATING UNITS *(if any)*

LTD, NHLBI

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.5	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Automatic control of a time-resolved fluorescence spectrophotometer was developed to enable the rapid collection of fluorescence spectra. Several peripherals of the laser based system are controlled by a Hewlett-Packard Series 1000 mini-computer, including the acquisition, transfer, and storage of data, the selection of samples, and the automatic positioning of monochromators for wavelength selection. The control of these peripherals allows data to be collected more quickly than is possible with a manual system, with little or no operator intervention, and also allows maximum flexibility in the design and enhancement of experiments.

Specific experiments that incorporate computer control and acquisition include alternating between sample and reference lamp data acquisition at fixed wavelengths to achieve fluorescence decay curves, and collecting time-resolved fluorescence data from a sample while rapidly scanning through a series of wavelengths. Because modular programming was used, new experiments can be easily configured.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10232-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Hardware Expansion for Flow Cytometer

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson,	Electronics Engineer,	EEES, BEIB, DRS
J.A. Dvorak, Dr.		LPD, NIAID

COOPERATING UNITS *(if any)*

LPD, NIAID
ACES, BEIB, DRS
EUII, BEIB, DRS

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronics Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	0.3	0.7

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The Flow-Cytometer in LPD has had extensive modifications made to it in two distinct areas. This lab has been responsible for the enhancement of the computer system and the system electronics. The computer was upgraded from a DEC PDP-8 to a DEC PDP11/40 and then to a DEC PDP11/34 with a 67Mb disk system and a 1600 Bpi tape drive. Along with the hardware changes, numerous software changes are planned to ease the operation of the Flow-Cytometer in the future.

The forward angle scatter detector has been replaced along with the Laser and most of the Flouresence optics (ACES). Also a Coulter Volume circuit has been added and many changes have been made to the interface electronics to increase the sensitivity of the instrument.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10233-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Computer System for Analysis of Monkey Vocalizations

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson,	Electronics Engineer,	EEES, BEIB, DRS
Dr. D. Symmes,		LCE, NICHD

COOPERATING UNITS *(if any)*

LCE, NICHHD
EUII, BEIB, DRS

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.2	0.3

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A computer system has been assembled to analyze monkey vocalizations and display the results in the traditional format of waterfall displays.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10234-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Computer Aided Tracking of Myosin Coated Beads on Actin Filaments

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson,	Electronics Engineer	EEES, BEIB, DRS
D.Sellers,		LMC, IR, NHLBI

COOPERATING UNITS *(if any)*
LMC, IR, NHLBI
EUII, BEIB, DRS

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronics Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.2	0.1

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A system using a microcomputer with a graphics board, mouse, timer, and video board is being put together with a color TV camera and a VCR to track Myosin coated beads over time as they interact with Actin. The programming is being done in complied BASIC and Pascal to collect and display the data.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 10235-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Filtration of Cholesterol in vivo from Human Subjects

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson,	Electronics Engineer,	EEES, BEIB, DRS
Dr. H. Klein		BB, CC

COOPERATING UNITS *(if any)*

BB, CC
EUII, BEIB, DRS

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.2	0.3

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Some human subjects have extremely high levels of cholesterol and an experimental protocol has been devised to filter out large amounts of cholesterol using a commercial cell separator followed by filtration of the plasma and re-injection of the plasma into the subject.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10236-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Instrumentation for Various Electron Microscopes

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson	Electronics Engineer	EEES, BEIB, DRS
C.E. Fiori	Physicist	OC, BEIB, DRS

COOPERATING UNITS *(if any)*
EUII, BEIB, DRS
CSL, DCRT

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Electrical and Electronic Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.1	0.2

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Planning is underway to control the Cameca Microprobe with an IBM PC-XT equipped with a number of add in peripheral cards to control the wavelength spectrometers, collect the various analog and digital signals, control the stage movement, transfer the collected data to the PDP11/60 for display and analysis, and provide miscellaneous functions such as nitrogen filling, beam blanking, and contrast control.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10237-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Text to Digital Character Conversion

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

J.R. Ellis	Expert	OC, BEIB, DRS
H. Marshall		OC, OD
M. Brandenberg		OC, OD
J. Gruber		EU1, SES, BEIB, DRS

COOPERATING UNITS *(if any)*
OC, OD

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Office of the Chief

INSTITUTE AND LOCATION
DRS, National Institutes of Health

TOTAL MAN-YEARS: .15	PROFESSIONAL: .10	OTHER: .05

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The NIH Office of Communications desired to form a computer readable list of NIH alumni, current and former affiliations, and addresses for the the NIH Centennial celebration. In general, the digital tape records of personnel and affiliations are no longer available. Many relevant printed and typed documents, such as the series of NIH Scientific Directories, are available. This organization wished to read such records and use the results for mailing lists, and other record keeping for this reunion.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10238-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Automation of BEIB Information Processing Functions

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
J.R. Ellis, Expert, OC, BEIB, DRS
A.G. Stringer, Administrative Officer, OC, BEIB, DRS
H.S. Eden, Deputy Chief, OC, BEIB, DRS
C.Martin, Management Analyst MAO, DRS

COOPERATING UNITS *(if any)*
MAO, DRS
CSL, DCRT

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Office of the Chief

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.5	2.0	0.5

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The computational and accounting resources of the branch are often inadequate to the demands placed on them. The objective of this project is three-fold. The first is to determine the needs of the branch. Second, we need to identify and obtain appropriate resources from the modern world of computer science and data processing. Third, there is a requirement to match resources in a fast-moving scenario and changing user demands that cannot be specified in advance.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10240-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Clinical Measurement of Microvascular Blood in Sickle Cell Patients

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
E.C. Walker, Mechanical Engineer, A.C.E., BEIB
G.P. Rodgers, Clinical Associate, LCB, NIDDK

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.5	1.5	

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☒ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Current viewpoints assume that manifestations of sickle cell disease result from the obstruction of capillary networks by abnormal erythrocytes during deoxygenation. Using a commercially available Laser Doppler Velocimeter (Med Pacific LD 5000) we propose to monitor non-invasively cutaneous blood flow in stable sickle cell patients under various conditions of steady state and perturbed flow. Additionally, since red cell deformability is a key factor in determining capillary flow we will monitor in vitro filtration rates of cells under various conditions.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10241-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Cisplatin Kinetics

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
P.J. Parsons Visiting Fellow, BEIB, DRS
P.F. Morrison, Physical Scientist, BEIB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Chemical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: 0.3	PROFESSIONAL: 0.3	OTHER:

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Experimental and theoretical studies on the chemistry of cisplatin (DDP) have been initiated with the goal of characterizing the reaction kinetics of the drug in vitro. This knowledge should lead to an identification of the principal reactive species and pathways, with attendant implications for the design of drug protocols.

Refinement of the separation and detection techniques required for the investigation has been undertaken. An improved high-performance liquid chromatography and hanging mercury drop electrode technique has been used to follow the fate of DDP and its major hydrolysis products in various aqueous media. Peaks corresponding to the two metabolites have been identified by using off-line fraction collection with platinum determination by atomic absorption methods; kinetic analysis of these platinum-containing peaks has confirmed their identities. The results of kinetic studies are in remarkably good agreement with results of other researchers, but they leave many unanswered questions pertaining to the nature of the reaction mechanism.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10242-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Automated Method for the Detection of Animal Circling

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*
A. Markowitz, Electronic Engineer, ACES, BEIB, DRS
W. Schuette, Chief,ACES, BEIB, DRS
B. Chidakel, Electronic Tech, BEIB, DRS
K. Bankiewicz, Physician, NINCDS
T. Tedder, Mechanical Tech, BEIB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.5	1.0	0.5

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Parkinson's disease is chemically induced by infusion of MPTP into the right internal carotid artery of an animal. The infusion produces injury to one side of the brain, causing Parkinson symptoms and spontaneous motor activity of circling toward the injured side. Treatment with drugs (apomorphine or L-DOPA/ carbidopa) or brain implants causes circling towards the intact side.

An automated method to measure this circling as a function has been developed. The rotation of the animal is plotted as a bar graph as function of time. The previous method of monitoring animals by means of television was both time consuming and expensive, especially with multiple animal experiments.

The system consists of back-pack-mounted infra-red (IR) emitting transmitters, cage mounted IR sensors, specialized electronics and a microcomputer system capable of monitoring many animals simultaneously.

Each IR transmitter consists of an oscillator pulsing four IR light emitting diodes (LED), mounted on a 9 volt transistor radio battery and inserted in a jacket worn by the animal. A radiation pattern of 180 degrees is achieved by the transmitter. An IR phototransistor is the receiver, and it is mounted in the center of each cage wall. The output of each detector is amplified by a high pass amplifier, full wave rectified, processed by a slow time constant low pass filter and then presented to a 32 channel A/D converter located in a Zenith Z-100 PC computer system.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10243-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Using Acyclovir to Prevent UVB Light Reactivation of Herpes Simplex

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. Corsey Electronic Engineer BEIB, DRS
S. Straus Section Chief NIAID
J. Rooney Research Associate NIDR
A. Notkins Research Associate NIDR

COOPERATING UNITS *(if any)*

Nursing Department, Clinical Center

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.0	1.5	0.5

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Ultraviolet light (UVB) has been demonstrated to induce reactivation of Herpes Simplex Virus in non-genital areas in which prior recurrences had been observed. The purpose of this study is to evaluate the ability of acyclovir to suppress the induction of recurrent Herpes Simplex Virus infection by UVB light. Patients will be randomized on a cycle of radiation to receive oral acyclovir or placebo pills for six days in a double-blind study. Each cycle will consist of four challenge irradiations with four miminal erythematous doses of UVB light each. Each patient will be followed for documentation of recurrent lesions induced by UVB light or spontaneously occuring lesions throughout the course of the study. Acyclovir has been shown to have significant effects on pain, lesion crusting, lesion healing and viral sheading when administered intravenously. It has also been shown to have significant efficacy in relief of pain, itching and viral sheading time when topically administered. Oral as opposed to intravenous or topical acyclovir will be used exclusively in this study. An area of skin which is near but not overlapping sites previously involved with herpetic recurrence will be selected. A template will be utilized to isolate four 1 cm in diameter areas of skin. A special apparatus which can hold four fluorescent tubes at a distance of 25.4 cm from the target site will be utilized. The fluorescent tubes will have output primarily of UVB (290-320 nm) with a reduced output of UVA (320-400 nm) average caucasian skin pigmentation would call for about four minutes exposure with increased melanin requiring more exposure time.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 10244-01 BEI

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Exogenous Insulin to Treat Anorectic Weight Losing Cancer Patients

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. Corsey	Electronic Engineer, BEIB, DRS
J. Norton	Section Chief, NCI
K. Kern	Research Associate NCI

COOPERATING UNITS *(if any)*
Nutrition Department Clinical Center, NIH
Nursing Department Clinical Center, NIH

LAB/BRANCH
Biomedical Engineering and Instrumentation Branch

SECTION
Applied Clinical Engineering

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.0	1.5	0.5

CHECK APPROPRIATE BOX(ES)
☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
 ☒ (a1) Minors
 ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Weight loss is a common problem in patients with cancer, affecting their quality of life and their ability to respond to therapy. Total parenteral nutrition has not been able to reverse the body depletion phenomenon to the point where oncologist question the efficacy of its use in the cancer patient. On the other hand, insulin has been shown to improve food intake, nitrogen balance and body weight in wasting-state rats without stimulating tumor growth. Insulin treatment has also been shown to increase body cell mass, the fundamental structural component of animals. In rat studies, this improvement has led to improved survival following tumor resection. This study will evaluate 20 patients who have lost at least 10% of normal body weight, have biopsy proven cancer and are in an anorectic state. The patients also must have a functioning gastro-intestinal tract. The following questions will be investigated.

1. Can low-dose exogenous insulin improve body weight, cell mass, food intake, nitrogen balance and body catabolism of an anorectic patient with cancer?
2. Can exogenous insulin accomplish the above without developing dangerously low blood sugar levels?

A whole body counter will be used to measure the K40 level of each patient. This measurement relates directly to the body cell mass. Resting energy expenditure will be determined and the metabolic kitchen will be utilized for a balance study.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10245-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Positions Emission Tomography in the Study of Extremity Soft Tissue Sarcomas.

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. Corsey	Electronic Engineer	BEIB, DRS
J. Norton	Section Chief	NCI
A. Chang	Research Associate	NCI

COOPERATING UNITS *(if any)*

Nutrition Department, Clinical Center, NIH
Department of Nuclear Medicine, Clinical Center, NIH
Laboratory of Pathology, National Cancer Institute, NCI

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: 2.0	PROFESSIONAL: 1.5	OTHER: 0.5

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☒ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Positron Emission Tomography (PET) can be used to measure glucose utilization in human tumors. Since rapidly growing poorly differentiated neoplasms have higher rates of glycolysis than slow growing well differentiated neoplasms, PET scanning may be used to categorize the degree of malignancy. It has already been used to predict survival time in glioma patients and it has been used to image glucose utilization in extremity soft-tissue sarcomas. Since no study has correlated glucose utilization rate in extremity sarcomas with histologic grade or clinical outcome, the present study will attempt to answer the following questions:

1. Can PET scan results be used to estimate glucose utilization rates reproducibly?
2. Do PET scan results of glucose utilization rates correlate with histopathology as read in the Department of Pathology?
3. What is the glucose 6-phosphatase level of fresh human tumor after resection of extremity sarcomas?
4. What is the fresh glucose 6-phosphatase activity of human muscle from extremity sarcoma specimens?

Patients will be studied for resting energy expenditure by the method of indirect calorimetry. This will help gather information about any distant metabolic effects produced by soft-tissue sarcomas resulting in abnormal glucose metabolism.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10246-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Acousto-Optically Controlled Light Source for Microscopy

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Pnncipal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	P.D. Smith	Physicist	BEIB, DRS
Others	K.G. Spring		LKE, NHLBI

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electronic and Electrical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Md. 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.25	.25	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

An optical system, featuring an acousto-optic element, was designed as an illumination source for a microscope. This arrangement provides significant advantages over conventional light sources. First, the wavelength of illumination can be readily changed; second, the intensity of the illumination can be adjusted to a constant level; third, both the wavelength and intensity changes can be accomplished at rates up to several MHz by signals originating in computer software.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10247-01 BE1

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

The Effect of Mitral Valve Replacement On Left Ventricular Geometry

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Thomas L. Talbot,	M.S.	ACES	BEIB	DRS
Robert J. March,	M.D.	SB	NHLBI	
Richard E. Clark,	M.D.	SB	NHLBI	

COOPERATING UNITS *(if any)*

Surgery Branch, NHLBI

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Applied Clinical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
3.0	2.0	1.0

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The correction of chronic mitral insufficiency by conventional mitral valve replacement carries a higher postoperative morbidity and mortality than operation for most other valvular lesions. Clinical studies have shown that valvuloplasty performed to correct mitral insufficiency is associated with a lower morbidity and mortality than with valve replacement. It is suggested that the maintenance of the mitral apparatus (chordae tendinae) prevents enlargement of end-diastolic and end-systolic dimensions. By utilizing each ventricle as its own control, the effect of chordal severence after valve replacement on regional and global geometry was examined. Two groups of animals (chronic and acute) were compared.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10248-01 BEI

PERIOD COVERED

October 1, 1985 - September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Intra-arterial Optical Evaluation

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	P.D. Smith	Physicist	BEIB	DRS
Others	R.F. Bonner	Biophysicist	BEIB	DRS
	R. Balaban	Physical Scientist	LKE	NHLBI
	M.B. Leon	Cardiologist	CB	NHLBI
	D. Lu	Clinical Assoc.	CB	NHLBI
	R.L. Bowman	Chief	LTD	NHLBI

COOPERATING UNITS *(if any)*

NHLBI

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	1.0	

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Evaluation of the intra-arterial wall surface is necessary for control of surgical procedures envisioned using laser ablation of tissue. Angioscopy inside vessels produces clear observation of the target sites provided adequate irrigation of saline solution is maintained. Precise quantitative location of the target is difficult. In addition, size constraints may limit angioscopy's usefulness in the coronary vessels.

Preliminary fluorescent observation of human atheromatic and normal aorta specimens was performed using a fluorescence microscope with 450-490nm excitation. Fluorescence spectra collected using a multi-channel analyzer indicated clear intensity differences between the normal and atheromatic tissue. These differences were reduced and eliminated by ablation of the atheroma by either an argon laser (514nm) or a xenon chloride (308) excimer laser.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 10249-01 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Kinetics of Folate Metabolism

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

P.F. Morrison,	Physical Scientist	BEIB, DRS
C.J. Allegra,	Physician	CP, NCI

COOPERATING UNITS *(if any)*

Clinical Pharmacology Branch, NCI

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Chemical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.5	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Over the last decade, research has shown that the antifolate effects of the drug, methotrexate (MTX), are mediated by its polyglutamate metabolites. The polyglutamates are known to be responsible, directly or indirectly, for inhibition of both thymidylate and purine synthesis. Ultimately we are interested in formulating a biochemical kinetic model useful for exploring various hypotheses of purine inhibition by MTX, but before this is possible, the kinetics of MTX cellular transport and of its polyglutamation must be described.

Accordingly, the polyglutamation kinetics of methotrexate (MTX) in MCF-7 human breast cancer cells have been formulated mathematically. The model accounts for glutamation and hydrolysis kinetics up through the pentaglutamate level, increased synthesis of dihydrofolate reductase following exposure to drug, reversible tight-binding to reductase, and membrane transport of all the drug polyglutamates. The glutamation, hydrolysis, and efflux parameters have been determined from fits to experimental MTX polyglutamate uptake and efflux data. The preferred substrate for folypolyglutamyl synthase in the intact cell has been shown to be MTX diglutamate, on average being 2 to 3 times as reactive as either the parent drug or the triglutamate. Hydrolysis rate constants exhibit no clear trend with chain-length because of the large uncertainty of each parameter estimate. However, the efflux of MTX polyglutamates from MCF-7 cells does show a trend with chain-length, decreasing with increasing length as expected. The model also shows quantitative agreement with the fraction of MTX polyglutamates found still to be bound to reductase in MCF-7 cells following 24 hrs of efflux.

VETERINARY RESOURCES BRANCH
DIVISION OF RESEARCH SERVICES
NATIONAL INSTITUTES OF HEALTH

FY 1986 VRB ANNUAL REPORT

Dr. Stephen Potkay, Chief

VRB Research Projects (Z01 RS)

No.	Title	Investigator	Page No.
00001-16	Animal Model Development	C. T. Hansen	
00002-15	Development of Diets for Laboratory Animals	J. J. Knapka	
00051-07	Reproduction in Mutant Sheep Used for the Study of Hyperbilirubinemia	L. T. Stuart	
00070-02	Effect of Tocainide HCL Pretreatment of Surface-Induced Cardiac Hypothermia	M. April	
00071-02	Development of Genetic Profiles for Inbred Laboratory Rodents	J. S. Crowell	
00072-02	Pathogenesis of Cilia-Associated Respiratory (CAR) Bacillus Infections	K. S. Waggie	
00073-02	Lipid Metabolism of the *Macaca fascicularis*	D. E. Barnard	
00077-02	Development of an Embryo Cryopreservation Program in Laboratory Animals	P. M. Schmidt	
00078-01	Serum Cholesterol Values of the NIH WHHL Rabbit	D. E. Barnard	

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00001-16 VR

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT (80 characters or less. Title must fit on one line between the borders.)

Animal Model Development

PRINCIPAL INVESTIGATOR (List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)

PI:	Carl T. Hansen	Geneticist	SAS, VRB, DRS
Others:	Xi Lin	Visiting Fellow	SAS, VRB, DRS

COOPERATING UNITS (if any)

LAB/BRANCH

Veterinary Resources Branch

SECTION

Small Animal Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	1.0	0

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK (Use standard unreduced type. Do not exceed the space provided.)

The objective of this program is to develop new or refine currently available rat and mouse models utilizing the resources of the NIH the NIH Animal Genetics Resource (NIHAGR). The procedures involve choosing specific mutants which affect some component of the normal functioning of the organism and establishing them on different genetic backgrounds, i.e. inbred strains, by the appropriate mating systems. Once mutants are extablished on different backgrounds, different combinations are made to study interactions between them, and the role of the background genetics modifying their expression. In the mouse, the primary emphasis has been on four mutations, each of which affect different components of the immune system. The mutants involved are nude (nu), beige (bg), X-linked immune defect (xid) and motheaten (me). In the rat, extensive developmental work is underway with such mutants as toothless, (tl), osteopetrosis (op), nude (rnu) corpulent (cp), jaundice (j), diabetes insipidus (di) and myelin deficient (md).

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00002-15 VR

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Development of Diets for Laboratory Animals

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	J.J. Knapka	Nutritionist	SAS, VRB, DRS
Others:	D. Barnard	Biologist	SAS, VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Veterinary Resources Branch

SECTION

Small Animal Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.35	0.25	0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A continuing program in laboratory animal nutrition involves studies with the species that are most frequently used as animal models in biomedical research. The objective of the program is to improve the nutritional status of NIH production and research colonies of rats, mice, guinea pigs, rabbits, dogs, cats and various species of nonhuman primates. A series of factorially designed feeding trials are used to ascertain the nutrient requirements of the species of interest and to develop diets with more nearly optimal nutrient concentrations for their growth, reproduction, maintenance or general health status. This program has resulted in the development of open formula natural ingredient diets for all animal species maintained in significant numbers at the NIH except for dogs and cats.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00051-07 VR

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less Title must fit on one line between the borders.)*

Reproduction in Mutant Sheep Used for the Study of Hyperbilirubinemia

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	L.D. Stuart	Chief	UU, ACS, VRB, DRS
Others:	D.E. Wildt	Reproductive Physiologist	NZP, Smithsonian Institution
	S.C. Kalser	Director	Liver Diseases Prog., DDN, NIAID
	P.K. Chakraborty	Head	Research Division, Dept. of OB-GYN, USUHS

COOPERATING UNITS *(if any)*

Digestive Diseases and Nutrition Program, National Institutes of Arthritis, Metabolism and Digestive Diseases

LAB/BRANCH

Veterinary Resources Branch

SECTION

Animal Center Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS	PROFESSIONAL	OTHER
.2	.1	.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A specific genetic strain of Corriedale sheep is used as an animal model for the study of liver pathophysiology, specifically, hyperbilirubinemia (Dubin-Johnson Syndrome). This project is concerned with increasing the numbers of animals available for research by the controlled breeding of individuals which genetically transmit this character. This project is utilizing what is considered to be the only existing Corriedale sheep homozygotic for this trait. Efforts are being made to obtain both homozygous and heterozygous offspring from these highly inbred individuals. Semen collected artificially from the homozygotic rams was diluted in various cryoprotective extenders and then freeze preserved. This will ensure the long-term availability of male gametes for artificial insemination. Overall, this project allows perpetuation of this specific gene pool and ensures availability of research animals for future investigations of Dubin-Johnson Syndrome and related metabolic disorders.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01-RS-00070-02 VR

PERIOD COVERED

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Effect of Tocainide HCl Pretreatment of Surface-Induced Cardiac Hypothermia

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	M. April	Chief	CU, ACS, VRB, DRS
Others:	J.C. Keith	Assist. Professor	VMRCVM (VA-MD Regional College Vet. Med.)
	P. Ruggera	Products Engineer	FDA, Center for Devices & Rad. Health
	J. Gainer	Assist. Br. Chief	FDA, Center for Devices & Rad. Health
	K. Roberts	Assist. Professor	VMRCVM (VA-MD Regional College Vet. Med.)
	G. Kantor	Chief Physicist	FDA, Center for Devices & Rad. Health

COOPERATING UNITS *(if any)*

Food and Drug Administration, Centers for Veterinary Medicine, and Devices and Radiological Health
VA-MD Regional College of Veterinary Medicine

LAB/BRANCH

Veterinary Resources Branch

SECTION

Animal Center Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER
0.037	0.025	0.012

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Studies with the beagle dog as the animal model will be conducted to ascertain the myocardial cytoprotective effects and antiarrhythemic effects of the new drug tocainide HCl (which is an orally active form of lidocaine HCl); and the rapid rewarming effects produced by a radio-frequency (RF) helical coil. Hypothermic studies (using beagle dogs) were also initiated to evaluate the effectiveness and safety of the RF coils to simulate rewarming human hypothermia casualties.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00071-02 VR

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Development of Genetic Profiles for Inbred Laboratory Rodents

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

J.S. Crowell, Geneticist	Comparative Pathology Section, VRB, DRS
S.L. Finley, Biochemist	Comparative Pathology Section, VRB, DRS

COOPERATING UNITS *(if any)*

Small Animal Section, VRB, DRS

LAB/BRANCH

Veterinary Resources Branch

SECTION

Comparative Pathology Section

INSTITUTE AND LOCATION

Division of Research Services, Bethesda, Maryland 20892

TOTAL MAN-YEARS: 0.5	PROFESSIONAL: 0.4	OTHER: 0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

This project is designed to identify and locate on the chromosomes of inbred rodents inherited characteristics which can be used in a wide range of biomedical research and to further the ability of the Genetic Monitoring Unit to perform its basic mission. The major areas of interest are: 1) characterization of the genetic traits by biochemical and immunological techniques; 2) chromosome mapping by standard genetic analysis; and 3) application of the genetic chracteristics to explore new animal models of pathogenesis.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00072-02 VR

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Pathogenesis of cilia-associated respiratory (CAR) bacillus infections

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

K.S. Waggie, D.V.M., Ph.D.	Comparative Pathology Section, VRB, DRS
A.M. Allen, D.V.M., Ph.D.	Comparative Pathology Section, VRB, DRS
T.H. Spencer, B.S.	Comparative Pathology Section, VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Veterinary Resources Branch

SECTION

Comparative Pathology Section

INSTITUTE AND LOCATION

Division of Research Services, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.4	0.1	0.3

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The cilia-associated respiratory bacillus was first demonstrated with silver stains of sections of the respiratory tract of rats by workers in the Netherlands. It was isolated in embryonated hen's eggs by staff of Comparative Pathology Section (Inf. and Immun., Feb. 1985) as a result of efforts to diagnose and characterize chronic respiratory disease in rats from an investigator's lab at NIH. To date the agent has not been grown on cell free media. Because of its gliding, flexing motion in the absence of evidence of means of locomotion, it is believed to be a member of the group of gliding bacteria. Preliminary pathology studies indicate that infections in rats result in chronic respiratory disease.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00073-02 VR

PERIOD COVERED

October 1, 1985 - September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Lipid Metabolism of the Macaca Fascicularis

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	D. Barnard	Biologist	SAS, VRB, DRS
Others:	J. J. Knapka	Nutritionist	SAS, VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Veterinary Resources Branch

SECTION

Small Animal Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.6	0.1	0.5

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects
  ☐ (a1) Minors
  ☐ (a2) Interviews
☐ (b) Human tissues
☒ (c) Neither

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The study will examine the metabolism of exogenous fatty acids by Macaca fascicularis. Trans fatty acids which cannot be synthesized by eukaryotes will be used as the exogenous fatty acid marker. These fatty acids are geometrical isomers of cis fatty acids which can be synthesized by eukaryotes. The trans fatty acids are catabolized and removed from the body shortly after the fatty acids are removed from the diet. Twelve male M. fascicularis monkeys are being used in the study. Six will be fed the control diet, and the others will receive the experimental diet. The objectives of the study are to determine if: (1) the monkeys have the gut flora required to produce trans fatty acids, (2) trans fatty acids are incorporated into the RBC membrane of the monkeys, and (3) the linoleate to arachidonate ratio of the erythrocyte membrane is altered.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00077-02 VR

PERIOD COVERED

October 1, 1985 - September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Development of an Embryo Cryopreservation Program in Laboratory Animals

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	Patricia M. Schmidt	Physiologist	SAS, VRB, DRS
Others:	David E. Wildt	Guest Researcher	VRB, DRS
	Carl T. Hansen	Geneticist	SAS, VRB, DRS
	Marissa A. Miller	Staff Fellow	SAS, VRB, DRS
	Karen L. Goodrowe	Guest Researcher	VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Veterinary Resources Branch

SECTION

Small Animal Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.3	1.3	1.0

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The program objective is to facilitate the management of the NIH Animal Genetic Resource (NIHAGR) through development and utilization of embryo collection, culture, freezing and transplantation as techniques for cryobanking genetic material and improving reproductive potential. The NIHAGR consists of several laboratory species for which cryobanking is ongoing in mice and being developed in rabbits. Cryobanking is confounded by unique genotypic responses to cryopreservation found in over 30 mouse genotypes investigated to date. Embryos are frozen in a programable unit at species specific rates to ensure embryo survival.

A cryoprotectant in the freezing medium allows sufficient dehydration to protect the blastomeres during freezing. Following thawing and dilution of the cryoprotectant, embryos are cultured to assess in vitro development. Transplantation of embryos into receipient females monitors in vivo development. In vitro fertilization and ova freezing are being examined as techniques to salvage limited genetic material from single females or strains with poor in vivo fertilization rates. Banked embryos are maintained in a frozen state until needed for rederivation. Concurrent comparative research studies are designed to identify modifications in methodology which will enhance female response to ovulation induction regimens, improve post-thaw embryo survival and examine the influence of genotype on embryo cryopreservation.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00078-01 VR

PERIOD COVERED

October 1, 1985 - September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Serum Cholesterol Values of the NIH WHHL Rabbit

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	Dennis Barnard	Biologist	SAS, VRB, DRS
Others:	Cheri Reid-Quinn	Veterinarian	SAS, VRB, DRS
	William Watson	Veterinarian	SAS, VRB, DRS
	Joseph Knapka	Nutritionist	SAS, VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Veterinary Resources Branch

SECTION

Small Animal Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	0.5	0.5

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The Veterinary Resources Branch, Division of Research Services established a Watanabe Heritable Hyperlipidemic Rabbit (WHHL) breeding colony to be used as a resource for investigators requiring the use of this animal model. The colony is being characterized for serum total cholesterol, cholesterol levels of the lipoprotein fractions and serum triglyceride levels. Blood is being collected from rabbits at the following ages: six weeks, three months, seven months, and one year. Total serum cholesterol values ranged from 310 to 1251 mg/dl with a mean of 828 mg/dl. The low density lipoprotein cholesterol values ranges from to 1185 mg/dl with a mean of 630 mg/dl. The serum triglyceride values ranged from 107 to 959 mg/dl with a mean of 394 mg/dl.

VETERINARY RESOURCES BRANCH
DIVISION OF RESEARCH SERVICES
NATIONAL INSTITUTES OF HEALTH

FY 1986 VRB ANNUAL REPORT

Dr. Stephen Potkay, Chief

VRB Research Projects (Z01 RS)

No.	Title	Investigator	Page No.
00001-16	Animal Model Development	C. T. Hansen	
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00051-07	Reproduction in Mutant Sheep Used for the Study of Hyperbilirubinemia	L. T. Stuart	
00070-02	Effect of Tocainide HCL Pretreatment of Surface-Induced Cardiac Hypothermia	M. April	
00071-02	Development of Genetic Profiles for Inbred Laboratory Rodents	J. S. Crowell	
00072-02	Pathogenesis of Cilia-Associated Respiratory (CAR) Bacillus Infections	K. S. Waggie	
00073-02	Lipid Metabolism of the *Macaca fascicularis*	D. E. Barnard	
00077-02	Development of an Embryo Cryopreservation Program in Laboratory Animals	P. M. Schmidt	
00078-01	Serum Cholesterol Values of the NIH WHHL Rabbit	D. E. Barnard	

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 000 01- 16 VR

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT (80 characters or less. Title must fit on one line between the borders.)

Animal Model Development

PRINCIPAL INVESTIGATOR (List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)

PI:	Carl T. Hansen	Geneticist	SAS, VRB, DRS
Others:	Xi Lin	Visiting Fellow	SAS, VRB, DRS

COOPERATING UNITS (if any)

LAB/BRANCH

Veterinary Resources Branch

SECTION

Small Animal Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	1.0	0

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK (Use standard unreduced type. Do not exceed the space provided.)

The objective of this program is to develop new or refine currently available rat and mouse models utilizing the resources of the NIH the NIH Animal Genetics Resource (NIHAGR). The procedures involve choosing specific mutants which affect some component of the normal functioning of the organism and establishing them on different genetic backgrounds, i.e. inbred strains, by the appropriate mating systems. Once mutants are extablished on different backgrounds, different combinations are made to study interactions between them, and the role of the background genetics modifying their expression. In the mouse, the primary emphasis has been on four mutations, each of which affect different components of the immune system. The mutants involved are nude (nu), beige (bg), X-linked immune defect (xid) and motheaten (me). In the rat, extensive developmental work is underway with such mutants as toothless, (tl), osteopetrosis (op), nude (rnu) corpulent (cp), jaundice (j), diabetes insipidus (di) and myelin deficient (md).

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00002-15 VR

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Development of Diets for Laboratory Animals

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	J.J. Knapka	Nutritionist	SAS, VRB, DRS
Others:	D. Barnard	Biologist	SAS, VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Veterinary Resources Branch

SECTION

Small Animal Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.35	0.25	0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A continuing program in laboratory animal nutrition involves studies with the species that are most frequently used as animal models in biomedical research. The objective of the program is to improve the nutritional status of NIH production and research colonies of rats, mice, guinea pigs, rabbits, dogs, cats and various species of nonhuman primates. A series of factorially designed feeding trials are used to ascertain the nutrient requirements of the species of interest and to develop diets with more nearly optimal nutrient concentrations for their growth, reproduction, maintenance or general health status. This program has resulted in the development of open formula natural ingredient diets for all animal species maintained in significant numbers at the NIH except for dogs and cats.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00051-07 VR

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Reproduction in Mutant Sheep Used for the Study of Hyperbilirubinemia

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	L.D. Stuart	Chief	UU, ACS, VRB, DRS
Others:	D.E. Wildt	Reproductive Physiologist	NZP, Smithsonian Institution
	S.C. Kalser	Director	Liver Diseases Prog., DDN, NIAID
	P.K. Chakraborty	Head	Research Division, Dept. of OB-GYN, USUHS

COOPERATING UNITS *(if any)*

Digestive Diseases and Nutrition Program, National Institutes of Arthritis, Metabolism and Digestive Diseases

LAB/BRANCH

Veterinary Resources Branch

SECTION

Animal Center Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.2	.1	.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A specific genetic strain of Corriedale sheep is used as an animal model for the study of liver pathophysiology, specifically, hyperbilirubinemia (Dubin-Johnson Syndrome). This project is concerned with increasing the numbers of animals available for research by the controlled breeding of individuals which genetically transmit this character. This project is utilizing what is considered to be the only existing Corriedale sheep homozygotic for this trait. Efforts are being made to obtain both homozygous and heterozygous offspring from these highly inbred individuals. Semen collected artificially from the homozygotic rams was diluted in various cryoprotective extenders and then freeze preserved. This will ensure the long-term availability of male gametes for artificial insemination. Overall, this project allows perpetuation of this specific gene pool and ensures availability of research animals for future investigations of Dubin-Johnson Syndrome and related metabolic disorders.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01-RS-00070-02 VR

PERIOD COVERED

TITLE OF PROJECT (80 characters or less. Title must fit on one line between the borders.)

Effect of Tocainide HCl Pretreatment of Surface-Induced Cardiac Hypothermia

PRINCIPAL INVESTIGATOR (List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)

PI:	M. April	Chief	CU, ACS, VRB, DRS
Others:	J.C. Keith	Assist. Professor	VMRCVM (VA-MD Regional College Vet. Med.)
	P. Ruggera	Products Engineer	FDA, Center for Devices & Rad. Health
	J. Gainer	Assist. Br. Chief	FDA, Center for Devices & Rad. Health
	K. Roberts	Assist. Professor	VMRCVM (VA-MD Regional College Vet. Med.)
	G. Kantor	Chief Physicist	FDA, Center for Devices & Rad. Health

COOPERATING UNITS (if any)

Food and Drug Administration, Centers for Veterinary Medicine, and Devices and Radiological Health
VA-MD Regional College of Veterinary Medicine

LAB/BRANCH

Veterinary Resources Branch

SECTION

Animal Center Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS.	PROFESSIONAL	OTHER
0.037	0.025	0.012

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK (Use standard unreduced type. Do not exceed the space provided.)

Studies with the beagle dog as the animal model will be conducted to ascertain the myocardial cytoprotective effects and antiarrhythemic effects of the new drug tocainide HCl (which is an orally active form of lidocaine HCl); and the rapid rewarming effects produced by a radio-frequency (RF) helical coil. Hypothermic studies (using beagle dogs) were also initiated to evaluate the effectiveness and safety of the RF coils to simulate rewarming human hypothermia casualties.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE **NOTICE OF INTRAMURAL RESEARCH PROJECT**	PROJECT NUMBER Z01 RS 00071-02 VR

PERIOD COVERED
October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Development of Genetic Profiles for Inbred Laboratory Rodents

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

J.S. Crowell, Geneticist	Comparative Pathology Section, VRB, DRS
S.L. Finley, Biochemist	Comparative Pathology Section, VRB, DRS

COOPERATING UNITS *(if any)*

Small Animal Section, VRB, DRS

LAB/BRANCH
Veterinary Resources Branch

SECTION
Comparative Pathology Section

INSTITUTE AND LOCATION
Division of Research Services, Bethesda, Maryland 20892

TOTAL MAN-YEARS: 0.5	PROFESSIONAL: 0.4	OTHER: 0.1

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

This project is designed to identify and locate on the chromosomes of inbred rodents inherited characteristics which can be used in a wide range of biomedical research and to further the ability of the Genetic Monitoring Unit to perform its basic mission. The major areas of interest are: 1) characterization of the genetic traits by biochemical and immunological techniques; 2) chromosome mapping by standard genetic analysis; and 3) application of the genetic chracteristics to explore new animal models of pathogenesis.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00072-02 VR

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Pathogenesis of cilia-associated respiratory (CAR) bacillus infections

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

K.S. Waggie, D.V.M., Ph.D.	Comparative Pathology Section, VRB, DRS
A.M. Allen, D.V.M., Ph.D.	Comparative Pathology Section, VRB, DRS
T.H. Spencer, B.S.	Comparative Pathology Section, VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Veterinary Resources Branch

SECTION

Comparative Pathology Section

INSTITUTE AND LOCATION

Division of Research Services, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.4	0.1	0.3

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The cilia-associated respiratory bacillus was first demonstrated with silver stains of sections of the respiratory tract of rats by workers in the Netherlands. It was isolated in embryonated hen's eggs by staff of Comparative Pathology Section (Inf. and Immun., Feb. 1985) as a result of efforts to diagnose and characterize chronic respiratory disease in rats from an investigator's lab at NIH. To date the agent has not been grown on cell free media. Because of its gliding, flexing motion in the absence of evidence of means of locomotion, it is believed to be a member of the group of gliding bacteria. Preliminary pathology studies indicate that infections in rats result in chronic respiratory disease.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 00073-02 VR

PERIOD COVERED
October 1, 1985 - September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Lipid Metabolism of the Macaca Fascicularis

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	D. Barnard	Biologist	SAS, VRB, DRS
Others:	J. J. Knapka	Nutritionist	SAS, VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH
Veterinary Resources Branch

SECTION
Small Animal Section

INSTITUTE AND LOCATION
DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.6	0.1	0.5

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
  ☐ (a1) Minors
  ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The study will examine the metabolism of exogenous fatty acids by *Macaca fascicularis*. *Trans* fatty acids which cannot be synthesized by eukaryotes will be used as the exogenous fatty acid marker. These fatty acids are geometrical isomers of *cis* fatty acids which can be synthesized by eukaryotes. The *trans* fatty acids are catabolized and removed from the body shortly after the fatty acids are removed from the diet. Twelve male *M. fascicularis* monkeys are being used in the study. Six will be fed the control diet, and the others will receive the experimental diet. The objectives of the study are to determine if: (1) the monkeys have the gut flora required to produce *trans* fatty acids, (2) *trans* fatty acids are incorporated into the RBC membrane of the monkeys, and (3) the linoleate to arachidonate ratio of the erythrocyte membrane is altered.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00077-02 VR

PERIOD COVERED
October 1, 1985 - September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Development of an Embryo Cryopreservation Program in Laboratory Animals

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	Patricia M. Schmidt	Physiologist	SAS, VRB, DRS
Others:	David E. Wildt	Guest Researcher	VRB, DRS
	Carl T. Hansen	Geneticist	SAS, VRB, DRS
	Marissa A. Miller	Staff Fellow	SAS, VRB, DRS
	Karen L. Goodrowe	Guest Researcher	VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH
Veterinary Resources Branch

SECTION
Small Animal Section

INSTITUTE AND LOCATION
DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.3	1.3	1.0

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The program objective is to facilitate the management of the NIH Animal Genetic Resource (NIHAGR) through development and utilization of embryo collection, culture, freezing and transplantation as techniques for cryobanking genetic material and improving reproductive potential. The NIHAGR consists of several laboratory species for which cryobanking is ongoing in mice and being developed in rabbits. Cryobanking is confounded by unique genotypic responses to cryopreservation found in over 30 mouse genotypes investigated to date. Embryos are frozen in a programable unit at species specific rates to ensure embryo survival.

A cryoprotectant in the freezing medium allows sufficient dehydration to protect the blastomeres during freezing. Following thawing and dilution of the cryoprotectant, embryos are cultured to assess in vitro development. Transplantation of embryos into receipient females monitors in vivo development. In vitro fertilization and ova freezing are being examined as techniques to salvage limited genetic material from single females or strains with poor in vivo fertilization rates. Banked embryos are maintained in a frozen state until needed for rederivation. Concurrent comparative research studies are designed to identify modifications in methodology which will enhance female response to ovulation induction regimens, improve post-thaw embryo survival and examine the influence of genotype on embryo cryopreservation.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00078-01 VR

PERIOD COVERED

October 1, 1985 - September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Serum Cholesterol Values of the NIH WHHL Rabbit

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	Dennis Barnard	Biologist	SAS, VRB, DRS
Others:	Cheri Reid-Quinn	Veterinarian	SAS, VRB, DRS
	William Watson	Veterinarian	SAS, VRB, DRS
	Joseph Knapka	Nutritionist	SAS, VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Veterinary Resources Branch

SECTION

Small Animal Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	0.5	0.5

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
- ☐ (a1) Minors
- ☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The Veterinary Resources Branch, Division of Research Services established a Watanabe Heritable Hyperlipidemic Rabbit (WHHL) breeding colony to be used as a resource for investigators requiring the use of this animal model. The colony is being characterized for serum total cholesterol, cholesterol levels of the lipoprotein fractions and serum triglyceride levels. Blood is being collected from rabbits at the following ages: six weeks, three months, seven months, and one year. Total serum cholesterol values ranged from 310 to 1251 mg/dl with a mean of 828 mg/dl. The low density lipoprotein cholesterol values ranges from to 1185 mg/dl with a mean of 630 mg/dl. The serum triglyceride values ranged from 107 to 959 mg/dl with a mean of 394 mg/dl.

PHS 6040 (Rev. 1/84)

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